Upper Big Hole River Watershed Assessment Report

Dillon Field Office

December 17, 2009

Wetland #1960 - The First of Many Lowder Potholes Inventoried. Jumbo Mountain Allotment, June 2009.

Table of Contents

Table of Contents – Continued

Figures

Tables

Table of Contents – Continued

Introduction

This document is a land health assessment of the public lands administered by the Bureau of Land Management (BLM) in the Upper Big Hole River Watershed. The Upper Big Hole River Watershed (UBHW) lies in the southwest corner of Montana, about 50 miles west of Dillon, Montana. The BLM isn't a major landowner in the UBHW administering only 6332 acres of public land in a watershed containing 770,761 acres. These BLM lands which comprise less than 1% of the total land base within the watershed are being assessed and evaluated for conformance with rangeland health standards. If appropriate, opportunities for more efficient administration and management of BLM lands in the UBHW (beyond land health standards) are also discussed in this document. Vicinity and local maps of the BLM parcels included in this assessment are found on Map 1.

The BLM is charged with maintaining the health of the land or making appropriate changes on the ground where land health standards are not being achieved. Title 43 Code of Federal Regulations (CFR) 4180 provides regulatory direction for integrating livestock grazing administration with Land Health Standards.

In response to 43 CFR 4180.2 (b) the Western Montana Resource Advisory Council recommended the following five standards for rangeland health which were adopted by the BLM and apply to lands administered by the Dillon Field Office.

- Standard #1: Uplands are in proper functioning condition.
- Standard #2: Riparian and wetland areas are in proper functioning condition.
- Standard #3: Water quality meets State standards.
- Standard #4: Air quality meets State standards.
- Standard #5: Provide habitat as necessary, to maintain a viable and diverse population of native plant and animal species, including special status species.

Standards are statements of physical and biological condition or degree of function required for healthy sustainable rangelands. Achieving or making significant progress towards these functions and conditions is required of all uses of public rangelands as stated in CFR 4180.1. The standards are used to communicate current and desired resource conditions amongst the various groups, and guidelines are used to describe or communicate techniques for managing activities to achieve those desired conditions.

Sequence of Events

This report is the first in a series of three potential documents; the assessment and evaluation report, the authorized officer's Determination of Standards, and an environmental document (usually an environmental assessment) which would propose and analyze the impacts of management alternatives necessary to address or correct identified resource concerns.

During the 2009 field season the BLM collected resource information and inspected resource conditions on twelve grazing allotments and five unallotted parcels in the UBHW of southwest Montana. Four of these parcels are identified as unavailable for grazing in the Dillon Resource Management Plan and one is unleased. Historic information and resource data collected in

previous years was also reviewed in preparing this synopsis of resource conditions of public lands within the assessment area.

This assessment discloses the existing condition of BLM lands within the watershed. The "Findings & Analysis" sections of this document analyze and interpret the resource conditions relative to land health standards, and evaluate the degree of achievement of land health standards. Where evidence suggests land health standards aren't being met, the Interdisciplinary Team (IDT) evaluated the causal factors. Management and project recommendations are suggested for improving resource conditions where needed. The authorized officer considers this report then makes a determination of whether Standards are met.

This document does not constitute a decision, but it provides the foundation for the Dillon Field Manager to make his determination on whether or not existing grazing management practices or levels of grazing use on public lands are significant factors in failing to achieve the standards and conform to the guidelines for livestock grazing management. Additional public scoping to initiate the National Environmental Policy Act (NEPA) planning process will begin for areas not meeting land health standards shortly after the Determination of Standards is signed. Preparation of any associated environmental document is expected to take place in the winter of 2010.

Watershed Background

Vegetation in the watershed reflects the diversity of ecological conditions across the landscape. The dominant plant communities and habitat types change according to soils, precipitation, elevation, slope and aspect (direction the slopes are facing). A wide variety of vegetation is found, from wetland and riparian species dependent on water and moist soils, to sagebrush and grass dominated plant communities that thrive on dryer sites. Forested habitats cover the higher elevations. This diverse landscape provides habitat and structural niches for a wide variety and abundance of wildlife.

Prehistory and History

In conjunction with the Mountain Foothills Grazing EIS in the late 1970s, a Class II cultural resource inventory was completed for a 10% sample of lands within the Dillon Field Office. Results of the inventory located a mixture of prehistoric and historic sites throughout the watershed. The UBHW was occupied continuously from approximately 10,000 years ago until European contact, consisting primarily of small habitation and/or procurement sites (Earle 1980). Various tribes continued to use the Big Hole valley through European contact as a travel route to areas north and south. Judging from historic accounts, describing abundant wild game and edible plants, it is also assumed that the valley provided good opportunity for food procurement (University of Nebraska Press 2005).

Historically, the UBHW was first explored during the Lewis and Clark expedition when William Clark stopped at the hot springs in 1806, referring to the valley as "Hot Springs Valley" (University of Nebraska Press 2005). Early fur traders passed through the valley 18 years later in 1824 during the Snake Country Expedition of Alexander Ross (Ross 1824). Cattle were first brought into the Big Hole Valley in 1874 from the nearby Horse Prairie, Beaverhead, and Deerlodge valleys for summer grazing. It was not until 1880 that cattle were wintered in the valley; however permanent ranching operations did not occur until 1883. In 1883 the first 100

head of steers were fed for beef: “260 tons of hay, according to measurement, in hand pitched stacks, was the amount fed; they were put on feed Christmas day, 1883 and started for Butte April 25, 1884” (Noyes 1914). Homesteading and larger ranching operations soon followed. Mining in the watershed occurred sporadically from 1862 until the 1930s without producing significant amounts of precious minerals (MTDEQ 2008c).

The Big Hole valley was also the site of the 1877 battle between U.S troops and Chief Joseph’s band of 800 Nez Perce men, women, and children fleeing their homeland of the Wallowa Valley in northeast Oregon (Shields 1889).

Fire History

The Big Hole Valley is typical of most of the Rocky Mountain west in its relationship to wildland fire. Fire history can serve as a critical baseline reference for ecosystem monitoring and restoration, fuels management, silviculture, and prescribed fire planning. Fire has shaped Western landscapes for the past 10,000 years, but over a century of settlement activities has seriously disrupted that crucial role (Arno 1980, Pyne 1982, Quigley et al 1996). Because of fire’s long-term absence, many Douglas-fir stands have thickened, especially on northerly aspects and lodgepole pine has encroached upon the sagebrush/grasslands. The resultant fuel buildups have therefore increased fire severity potential in a shift toward future mixed severity or stand replacing fires (Arno and Gruell 1986). Early photographs (Gruell 1983) verify that many areas in southwestern Montana previously had a greater mix of post-fire successional stages, including substantially more unforested terrain.

Recorded fire history from 1940 through 2009 (map 6), indicates that fire occurrence is widespread across the assessment area. There is no reason to believe that this pattern has not been the case throughout the evolution of the Big Hole Valley since the last ice receded. From 1835 to 1919, 29 large fires have been identified encompassing approximately 95,000 acres. A cold wet period followed resulting in only one large fire recorded in 1949. Sixty-five smaller fires are documented in this time period burning approximately 300 acres. What is interesting about this time period of fire history is that the large fires occurred primarily in the southern half of the watershed (Map 5). This resulted in the relatively even aged stands with very little ground litter currently present.

From 1957 through 2009, large fire occurrence has shifted to the northern half of the assessment area (Map 5). Schultz Creek is located in the far northwestern edge of the watershed. Researcher Steven Barrett in 1997 determined that a fire had not occurred in the drainage in 173 years (Barrett 1997). In 1988 this began to change. Sixteen large fires have since been recorded resulting in 79,500 acres burned in the northern portion of the assessment area. An additional 1050 acres have burned as 310 small fires were suppressed in the past 52 years.

The Lily Lake fire was started by lightning on August 13, 2009 on the east side of the assessment area. This fire was allowed to run its course as a Wildland Fire for Resource Benefit. When snow finally stopped the advance of the fire in late September, the fire had grown to 2120 acres. This incident was the first to be managed in this manner under new direction. Future management will allow similar fires within the watershed to burn in certain areas resulting in fire

regimes and condition classes that are more in line with historical fire frequencies and vegetative conditions.

Forest Management History

Forest resources in the watershed have been utilized since the beginning of European settlement during the 1880's. Evidence in the form of old stumps can be found across all ownerships through many of the forested habitats in the assessment area. Several landowners have logged and/or used fire on their private property in the UBHW. Acres treated are unknown. A primary objective was to provide cattle with more ground for forage (E. Coon and G. Johnson, pers. comm., 2009).

The BLM sells permits authorizing firewood removal and Christmas trees cutting outside of designated Wilderness or Wilderness Study Areas, which may be utilized in areas of the UBHW.

Forest Management activities (timber harvests) on BLM administered lands total 1,164 acres and are described in greater detail in Table 1 below (See Map 7 for BLM Forest Treatment Units within the Upper Big Hole Watershed).

Table 1. BLM Forest Management Activities

Year	Sale Name/Area	Acres	Silvicultural System	Sale Volume
1969	Rock Creek-Old	331	Clearcut	880 MBF
1985	Rock Creek Thinning I	174	Pre-commercial thin	Volume not measured- treated by acre
1985	Yank Swamp	119	Clearcut	1,088 MBF
1986	Rock Creek Thinning II	158	Pre-commercial thin	Volume not measured- treated by acre
1996	Rock Creek	237	Clearcut	1,333 MBF
2002	Mussigbrod Fire Salvage	145	Salvage	1,043 MBF

Livestock Grazing

There are 11 individual operators that have grazing leases on approximately 5900 acres (12 allotments) of public land administered by the BLM in the watershed. Public lands, administered by BLM, provide a relatively small proportion of the late spring, summer and fall forage base in the watershed. There are 433 animal-unit months (AUMs) of livestock forage allocated on public lands within the 12 allotments included in this assessment. The livestock grazing allocation and management for allotments and the parcels that are either unleased or unavailable for grazing in the UBHW are presented in Table 2.

Table 2. Livestock Grazing Allocation and Management within the UBHW

Allotment Name & Number	Mgmt Category	BLM Acres	Livestock # & Kind	Grazing Begin	Grazing End	% Public Land	Active AUMs	Grazing System
Big Swamp #10141	Custodial	168	8 cattle	June 1	Oct. 30	100	38	Season-long
Big Swamp Creek #20715	Custodial	364	15 cattle	June 1	Oct. 30	100	76	Season-long
Doolittle Tracts #20196	Maintain	40	6 cattle	Sept. 1	Sept. 30	100	6	Deferred
Dry Creek #20104	Improve	1085	249 cattle	July 1	Sept. 30	7	53	Rest-rotation *
Foxtail #30616	Improve	1386	15 cattle	July 1	Sept. 30	100	45	Season-long
Jumbo Mountain #20721	Improve	1539	7 cattle	June 26	Sept. 25	100	22	Season-long *
Moose Horn #00142	Improve	271	10 cattle	May 1	Oct. 30	100	61	Season-long
Mussigbrod On & Off #20705	Maintain	199	11 cattle	July 1	Sept. 30	100	34	Season-long *
North Fork Big Hole #10742	Custodial	80	3 cattle	May 15	Nov. 14	100	32	Season-long
Steel Creek #10743	Maintain	313	23 cattle	June 15	July 31	100	34	Season-long
Warm Springs #20596	Improve	321	3 cattle	May 15	Dec. 14	100	21	Season-long
Wildwood Individual #30250	Improve	126	2 cattle	May 15	Sept. 30	100	11	Season-long *
Unallotted Parcels								
Fox Gulch	Unleased	160	--	--	--	--	--	*
Swamp Creek	Unavailable	40	--	--	--	--	--	--
Dry Creek – Sec 29	Unavailable	40	--	--	--	--	--	--
Miner Creek – Sec. 1	Unavailable	160	--	--	--	--	--	*
Inabnit Butte	Unavailable	40	--	--	--	--	--	--

* At least portions of these allotments or parcels are fenced in with National Forest lands and are grazed in conjunction with Forest Service grazing allotments administered by the Wisdom Ranger District of the Beaverhead-Deerlodge National Forest.

Recreation & Travel Management
Recreation use is difficult to quantify and describe due to the mixed land ownership and isolated tracts of BLM lands within this watershed. There are no developed recreation sites and no special recreation permits authorized on BLM lands in this area. There is clearly recreational use occurring on BLM lands, mostly associated with hunting, snowmobiling, and river access on many of the BLM managed parcels. The majority of that use is associated with use on adjoining USFS lands and/or river use.

The BLM Dillon Field Office designated roads open to motorized use in the 2006 RMP, but said at that time that we would, "Update and maintain the road and trail database to correct mapping errors and refine decisions." The watershed assessment process provides an appropriate mechanism for refining these decisions due to the area-specific focus on multiple resources within each watershed.

Western Montana Standard #1: Uplands are in proper functioning condition.

Background Information

Uplands are defined as land at a higher elevation than the alluvial plain or low stream terrace; all lands outside the riparian-wetland and aquatic zones (USDI 1996). Uplands function properly when the existing vegetation and ground cover maintain soil conditions capable of sustaining natural biotic communities. The functioning condition of uplands is influenced by geomorphic features, soil, water, and vegetation (USDI 1994).

Affected Environment

Soils
Soils found on BLM uplands in the UBHW are generally medium to coarse textured and well drained. Parent materials are primarily alluvium, sediments deposited by flowing water, and colluvium, loose deposits of rock moved downslope by gravitational force. Parent materials of some of the soils that typically support forest and woodland habitats such as the Waldbillig gravelly loam and the Petty silt loam are volcanic ash over colluvium and alluvium.

A Sandy Ecological Site (ES) associated with the Danielvil sandy loam in the Steel Creek allotment and a Loamy ES associated with the Adel loam in the Fox Gulch –unleased tract appeared to be two of the more productive ecological sites visited during rangeland health assessments. Less productive and more commonly encountered soils and ecological sites included the Maybee silt loam; Droughty ES, Butchhill gravelly loam; Droughty Steep ES and the Bearmouth very gravelly loam; Shallow to Gravel ES. These soils and associated ecological sites were found on the Moose Horn, Warm Springs and Dry Creek allotments respectively.

Vegetation
The following discussion focuses on existing vegetation rather than potential natural vegetation or climax vegetation. The plant association concept that describes existing vegetation regardless of successional status has been used to characterize the most common upland plant communities in the UBHW. Scientific names of plants encountered on BLM lands within the Upper Big Hole watershed and discussed in this document appear in Appendix A.

Grasslands
Grasslands are defined as plant associations where shrub canopy cover is less than 5% and perennial graminoid vegetation constitutes at least 50% of the total herbaceous canopy cover. Relatively few grasslands were encountered on public land uplands during the UBHW field assessment.

The Idaho fescue / tufted hairgrass association is a minor subalpine meadow type associated with mesic or subirrigated sites found on public land in the UBHW. American bistort and slender cinquefoil are common forbs associated with this grassland type as was the case on the Moosehorn allotment. An example of the Idaho fescue / bluebunch wheatgrass association was noted on the moderately steep, southerly-facing slope in Fox Gulch.

Shrublands
Shrublands are defined as plant associations where shrubs are present in the aggregate, a shrubby aspect with at least 5% canopy cover of shrubs. Wyoming big sagebrush and low sagebrush shrublands occur in the UBHW, but weren't noted at major coverage on BLM lands. Mountain big sagebrush is the dominant shrub on BLM uplands within the watershed.

Mueggler and Stewart (1980) describe the Mountain big sagebrush / Rough fescue habitat type as the northwestern Montana equivalent to the Mountain big sagebrush / Idaho fescue and Mountain big sagebrush / Bluebunch wheatgrass habitat types found primarily in southwest Montana. One of the few known examples of this type in the Dillon Field Office can be found on BLM lands on the Fox Gulch – unleased tract.

More common is the Mountain big sagebrush / Idaho fescue habitat type which is found on BLM lands throughout the UBHW often occupying the niche between forest habitats and wetlands on sandy, loamy and shallow to gravel ecological sites. The Mountain big sagebrush / Idaho fescue/ Sticky geranium plant association occupies the most mesic of UBHW sagebrush habitats, either with the highest average precipitation or with favorable aspects. This association has the highest average shrub cover, as well as the greatest average undergrowth cover, nearly 20% greater than the next most productive association, Mountain big sagebrush / Idaho fescue/ western needlegrass (Lesica et al. 2005). Examples of the Mountain big sagebrush / Idaho fescue/ Sticky geranium association were noted on the Steel Creek allotment and examples of Mountain big sagebrush / Idaho fescue/ western needlegrass were found on the Mussigbrod allotment.

As long-term grazing pressure increases in Mountain big sagebrush types corresponding increases in threadleaf sedge and timber oatgrass can be expected at the expense of Western and Richardson's needlegrasses and Idaho fescue as was the case on the Dry Creek allotment and the Inabnit Butte unavailable tract respectively.

Forests & Woodlands
Forests are defined as plant associations where tree crowns are at least partially overlapping, forming 60 to 100% canopy cover. Woodlands are plant associations where tree crowns aren't usually touching, forming 25 to 60% canopy cover (Cooper et al. 1999). (Note: In some cases the tree canopy cover may be less than 25%, but the cover of other life forms is also less than

25% and tree cover exceeds the combined cover of these other life forms.) See Western Montana Standard #5 for full discussion of forests and woodlands in the UBHW.

Unique and/or Rare Native Plants

Lemhi beardtongue is a regional endemic that occurs only in southwest Montana and adjacent Idaho. This BLM sensitive species grows on moderate to steep, east- to southwest-facing slopes, often on open soils. In the upper Big Hole, it generally grows below or near the lower extent of Douglas-fir and/or Lodgepole pine forest, in habitat dominated by Mountain big sagebrush and bunchgrasses, including rough fescue, bluebunch wheatgrass and Idaho fescue. A new subpopulation was discovered on BLM's Steel Creek allotment in the course of conducting field work in preparation for the land health assessment. Fire suppression is believed to have played a significant role in the species' decline throughout its range while heavy livestock grazing limits seed production and can damage individual plants.

Findings and Analysis

The three existing Daubenmire trend studies in the UBHW were duplicated in 2009. The percent canopies and composition of mountain big sagebrush, and perennial bunchgrasses remained relatively constant between 1979 and 2009. Shifts in species composition including an apparent increase in threadleaf sedge with a corresponding decrease in Idaho fescue most likely occurred prior to the studies establishment on the Dry Creek allotment. The current livestock management is maintaining the mid-late seral plant communities at the 3 study sites. Inconsistencies in the time studies were read on the Mussigbrod allotment (September vs. June) certainly influenced data collected on forb frequency and composition. Follow-up rangeland health assessments on both allotments by the ID team found upland habitats to be functioning properly.

Additional rangeland health assessments and on-site inspections conducted on upland sites in the UBHW found all sites to be functioning properly with the exception of the Swamp Creek – Unavailable tract. The upland habitat on this tract was determined to be functional-at risk with a downward trend. Active rill formation, water flow patterns, litter movement and the amount of bare ground was moderately to much higher than expected for a shallow to gravel ecological site in the 13 – 19 inch precipitation zone. While the existing plant association still typed to a Mountain big sagebrush / Idaho fescue shrubland, poor vigor and production of the cool season bunchgrasses as well as the presence of spotted knapweed and cheatgrass contributed to the functional-at risk rating.

Descriptions of the Daubenmire monitoring methodology is found in the Interagency Technical Reference 1734-4, *Sampling Vegetation Attributes*, and the protocol used to assess the health of upland habitat is described in BLM TR 1737-6, *Interpreting Indicators of Rangeland Health* (Pellant et al. 2005). Both documents are available at the Dillon Field Office or online at http://www.blm.gov/nstc/library/techref.htm. Copies of the completed Daubenmire data sheets and upland health assessments are housed in the UBHW project file and can be obtained by request.

Recommendations

1. Actively pursue disposal of the Swamp Creek and Inabnit Butte unavailable parcels. (Both 40 acre parcels are in Land Adjustment Category 3 which are lands targeted for potential disposal in the Dillon RMP.)
2. Consider fencing the Swamp Creek and Inabnit Butte unavailable parcels on their respective BLM/private property boundaries.
3. Inventory & map the Lemhi beardtongue population discovered on BLM in 2009. The inventory should include the number of individual plants, a description of the habitat (e.g., associated species, soils, aspect, elevation) and an assessment of any existing and potential threats to the population.
4. Explore opportunities for using prescribed fire in occupied or potential Lemhi beardtongue habitat.

Western Montana Standard #2: Riparian and wetland areas are in proper functioning condition.

Background Information

Wetlands are lands transitional between aquatic (water) and terrestrial (upland) ecosystems. Most ecologists agree that no single, correct definition for wetlands exists, primarily due to the nearly unlimited variation in hydrology, soil, and vegetative types.

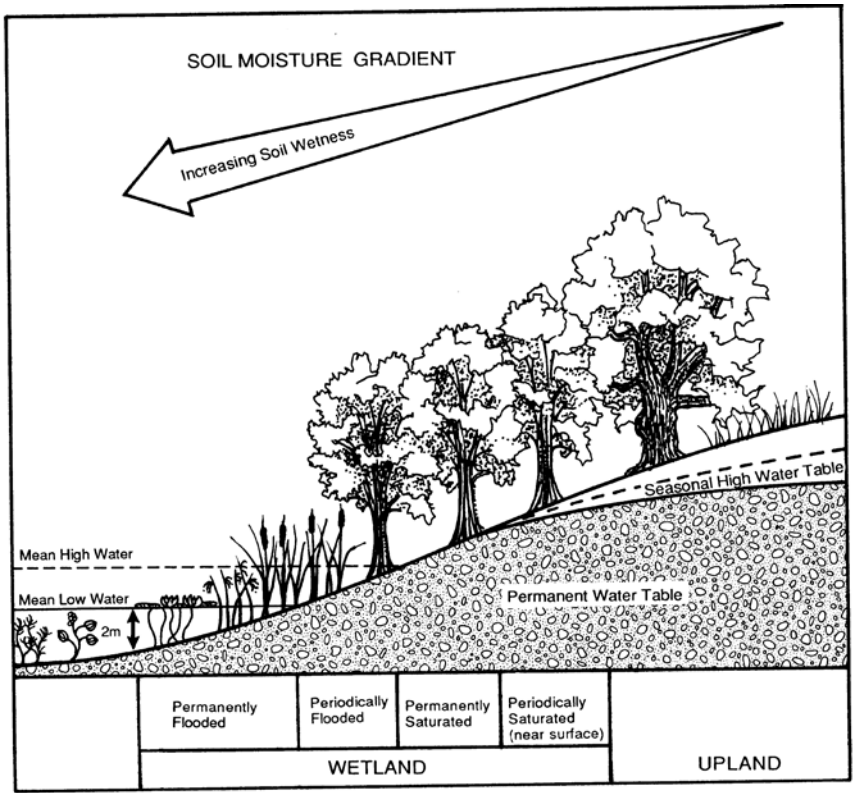

Figure 1: The general location of wetlands along the soil moisture gradient. The seasonal high water table represents the average height of the water table for a significant period during the wet part of the growing season in most years. (Tiner 1991)

The BLM along with many other federal and state agencies have long used ***lotic*** and ***lentic*** to separate wetlands associated with running water from those associated with still water. The U.S. Fish and Wildlife Service (USFWS) uses these terms along with ***terrene*** to describe the landscape position of interior or freshwater wetlands.

Lotic wetlands are associated with rivers, streams, and drainage ways. They contain a defined channel and floodplain. The channel is an open conduit, which periodically or continuously carries flowing water. Beaver ponds, seeps, springs, and wet meadows on the floodplain of, or associated with, a river or stream are part of the lotic wetland (Ecological Solutions Group 2008). A lotic river is a polygonal feature on a U.S. Geological Survey map or a National Wetlands Inventory Map (1:24,000/1:25,000) and a lotic stream is a linear feature on such maps (Tiner 2003).

Lentic wetlands are associated with still water systems. These wetlands occur in basins and lack a defined channel and floodplain. Included are permanent (i.e., perennial) or intermittent bodies of water such as lakes, reservoirs, potholes, marshes, ponds, and stockponds. Other examples include fens, bogs, wet meadows, and seeps not associated with a defined channel (Ecological Solutions Group 2008).

Terrene wetlands are surrounded or nearly so by uplands and lacking a channelized outlet stream; a stream may enter or exit this type of wetland but it does not flow through it as a channel; includes a variety of wetlands and natural and human-made ponds (Tiner 2003). For the purposes of this assessment report, terrene wetlands were evaluated using definitions and methodologies developed for lentic wetlands.

Lotic riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to dissipate stream energy associated with high waterflows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterfowl breeding, and other uses; and support greater biodiversity. The functioning condition of riparian-wetland areas is influenced by geomorphic features, soil, water, and vegetation (USDI 1994).

Lentic riparian-wetland areas are functioning properly when adequate vegetation, landform, or debris is present to dissipate energies associated with wind action, wave action and overland flow from adjacent sites, thereby reducing erosion and improving water quality; filter sediment and aid floodplain development; improve flood-water retention and ground-water recharge; develop root masses that stabilize islands and shoreline features against cutting action; develop diverse ponding characteristics to provide the habitat and the water depth, duration, and temperature necessary for fish production, waterbird breeding, and other uses; and support greater biodiversity (USDI 1999).

A comprehensive classification system of wetlands and deepwater habitats developed by the U.S. Fish and Wildlife Service (Cowardin et al. 1979) defines wetlands by plants (hydrophytes), soils

(hydric soils), and frequency of flooding. The structure of the "Cowardin" wetland classification is hierarchical, progressing from Systems and Subsystems, at the most general levels, to Classes, Subclasses, and Dominance Types. *Systems* refer to a complex of wetlands and deepwater habitats that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors while *Class* describes the general appearance of the habitat in terms of either the dominant life form of the vegetation or the physiography and composition of the substrate.

Affected Environment

Maps 2, 3, and 4 show individual BLM stream reaches and wetland locations within the UBHW.

Soils

The predominance of undrained hydric soils and hydrophytes (any plants living in water or on a substrate that is at least periodically anaerobic due to excess water) provide two main indicators of wetlands. Hydric soils are defined as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Hurt and Vasilas 2006). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation. Hydric soils found on BLM in the UBHW include Lowder, Lilylake, Tepete, Dunkleber, Finn, Redfish and Mooseflat. Ecological sites represented by these soils include wet meadow, riparian meadow and riparian subirrigated. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species (USDA 2009).

Vegetation

Some plants are always associated with wetlands, while others occur in both wetlands and uplands (dryland) to varying degrees. The USFWS established five basic categories of ''wetland indicator status'' reflecting different frequencies of occurrence in wetlands: 1) obligate (OBL; 99% of time in wetlands), 2) facultative wetland (FACW; 67–99% in wetlands), 3) facultative (FAC; 34–66%), 4) facultative upland (FACU; 1–33%), and 5) upland (UPL; <1%). Common obligate species within the UBHW include Bog birch, Planeleaf willow, Wolf's willow, Beaked sedge, Inflated sedge and Elephanthead. Examples of facultative wetland species in the UBHW include Booth's willow, Geyer willow, Drummond's willow, Bluejoint reedgrass, Tufted hairgrass and Blue camas. Quaking aspen, Shrubby cinquefoil, Alpine timothy, Mat muhly and Yampah are examples of facultative species known from public lands within the UBHW. Common snowberry is a facultative upland species that is occasionally (≤ 33% of the time) found in wetlands as was the case in Yank Swamp (wetland #1914).

Grasslands (includes communities dominated by sedges and rushes)

The Beaked sedge herbaceous "grassland" vegetation habitat type is the most common herbaceous plant association in the UBHW. The ID team identified 3 phases of beaked sedge habitats on public land based on moisture regimes with the beaked sedge / inflated sedge being the wettest habitat, beaked sedge / water sedge being intermediate, and beaked sedge / tufted hairgrass being the driest. The tufted hairgrass herbaceous vegetation plant association is the driest of the wetland grassland types observed on public land in the UBHW.

Forb-dominated Communities
A few of the deeper Lowder Potholes supported forb communities dominated by Bur-reed, Pondweed and Rocky Mountain pond-lily. Beaked sedge and inflated sedge were common associates around the edges of these potholes.

Shrublands
Eleven species of willow were identified on public lands during the riparian and wetland inventories in the UBHW. Other common obligate and facultative wetland shrub species noted during the wetland inventories included Bog birch and Thinleaf alder. Geyer willow / Beaked sedge is by far the most common wetland type found on BLM lands in the UBHW. Only one example of a Drummond's willow / Beaked sedge type and one example of a Shrubby cinquefoil / Tufted hairgrass type (wetlands #1923 and #1925 respectively) were documented during the wetland inventories.

Forests & Woodlands
Englemann spruce / Red-osier dogwood is the most common forested wetland type on public land in the UBHW. Lodgepole pine is a common facultative species in the UBHW that is often (34- 66% of the time) found in wetlands. A small example of a Lodgepole pine / Bog blueberry wetland type was observed near Yank Swamp Meadow (wetland #1913).

Unique and/or Rare Native Plants
BLM sensitive species Idaho sedge is a regional endemic that consistently occurs in subirrigated soils associated with low-gradient streams or springs and seeps. Idaho sedge is known from private wetlands in the Big Hole and likely occurs on BLM, but hasn't yet been confirmed from public lands within the UBHW.

Populations of BLM sensitive species Hiker's gentian and Primrose monkeyflower were discovered on the Foxtail and Dry Creek allotments during the field wetland health assessments. Hiker's gentian is an annual herb with erect stems which may be only a few inches or up to 15 inches in height. Primrose monkeyflower is a small, perennial herb that forms mats of small rosette-like plants from a network of thin shallow-rooted rhizomes. Both of these wetland obligates occupy fens, sphagnum bogs, and wet meadows in the montane and subalpine zones of the UBHW.

Hooded ladies' tresses is a native orchid that was found in association with Hiker's gentian and Primrose monkeyflower. Hooded ladies' tresses is relatively common and widespread in mountain wetland habitats through-out the west, and isn't on BLM's sensitive species list, but all orchids are listed under the Convention on International Trade in Endangered Species (CITES) as protected species. All four of the special status wetland plant species are vulnerable to changes in hydrology.

Two Cowardin wetland systems are found on public lands in the Upper Big Hole, Riverine and Palustrine. In general terms the Riverine System includes all wetlands and deepwater habitats contained within a channel that have less than 30% vegetative cover. The Big Hole River is an example of a Riverine System as are smaller streams with little or no vegetative cover within the UBHW. Figure 2 shows distinguishing features of the Riverine System.

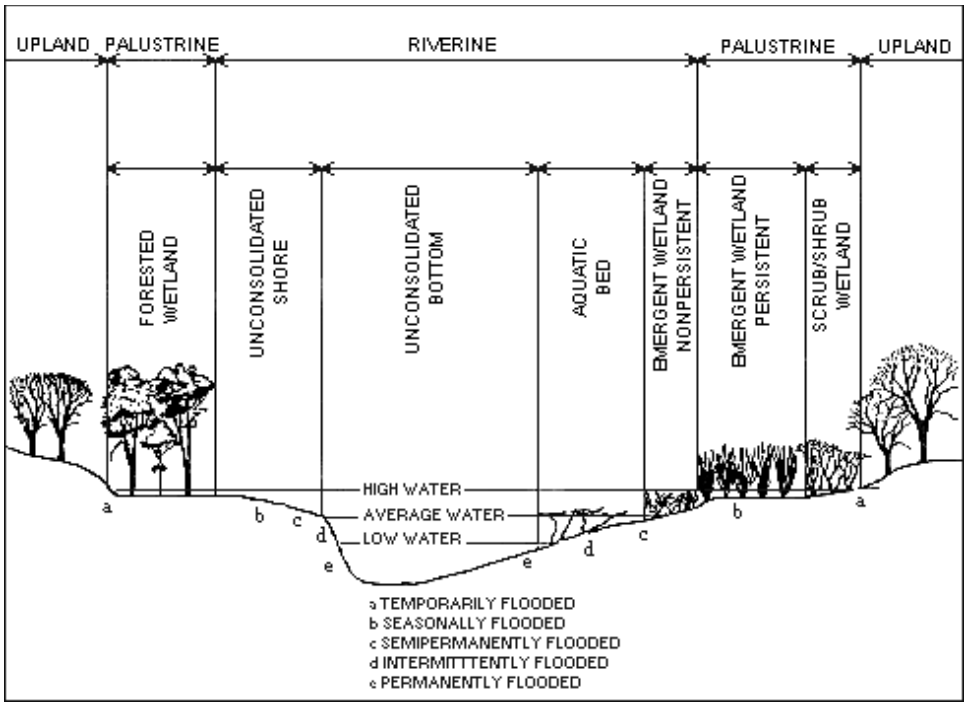

Figure 2: Distinguishing features and examples of classes in the Riverine System (Cowardin et al. 1979).

Since the majority of the riparian and wetland areas have greater than 30% vegetative cover, they fall into the Palustrine System. The Palustrine System includes all nontidal wetlands dominated by vegetation (> 30% areal coverage). Figure 3 shows distinguishing features of the Palustrine System.

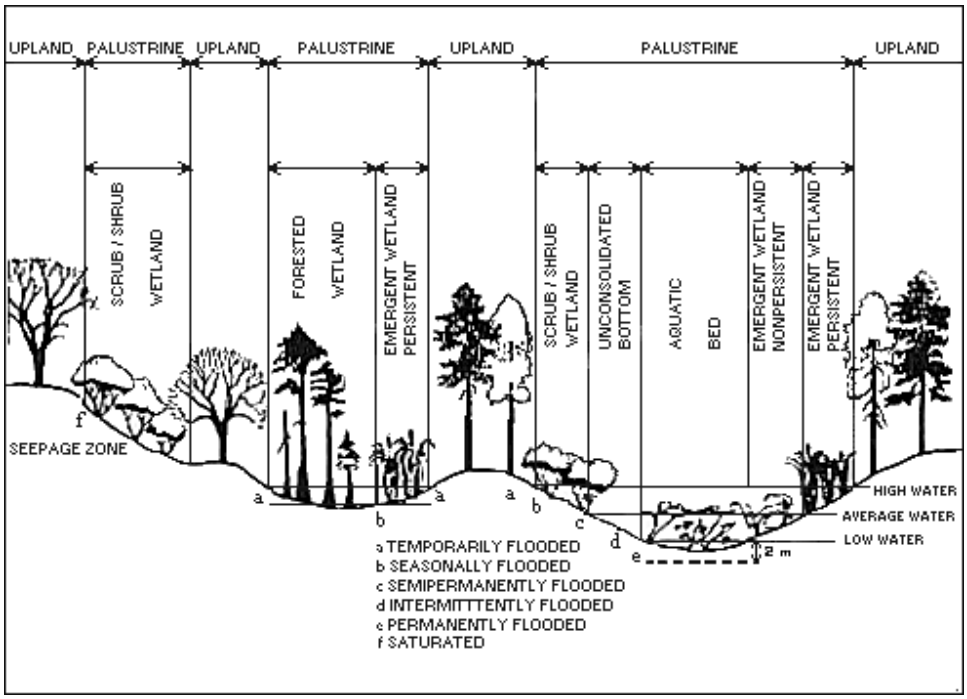

Figure 3: Distinguishing features and examples of habitats in the Palustrine System (Cowardin et al. 1979).

Five classes of the Palustrine System are found in the UBHW: Unconsolidated Bottom, habitats characterized by the lack of large stable surfaces for plant and animal attachment and a vegetative cover less than 30%; Aquatic Bed, habitats dominated by plants that grow on or below the surface of the water for most of the growing season; Emergent Wetlands, dominated by emergent herbaceous vegetation; Scrub-Shrub Wetlands, dominated by shrubs or small trees; and Forested Wetlands, dominated by trees over 20 feet tall.

A series of glacially formed basin wetlands in the Jumbo Mountain and Dry Creek allotments make up the Lowder Pothole Complex which is displayed on Map 4. Wetland numbers 1941 and 1945, dominated by Rocky Mountain pond-lily, bur-reed and pondweed provide examples of Aquatic Bed wetlands. Unconsolidated Bottom habitats are represented by Lowder Potholes #47 and # 50 (wetland numbers 1986 and 1996). The Beaked sedge habitat types found along the Bender Creek tributary (reach 1920) and in the Great Gray Wetland (wetland 1963) are examples of Emergent Wetlands. The Englemann Spruce/Red-osier Dogwood habitat type along Rock Creek (BLM stream reaches 1907 and 1908) are examples of Forested Wetlands and the Geyer Willow/Beaked sedge habitat type found in Yank Swamp (wetland 1914) provides an excellent example of a Scrub Shrub wetland.

The Cowardin wetland classification and habitat type for all BLM stream reaches and wetlands within the UBHW are presented in Appendix B.

Findings and Analysis

Six and one half miles or fifty-two percent of the BLM riparian areas in the UBHW are in proper functioning condition. Forty-eight percent of the BLM riparian areas are functional-at risk with static or downward trends or nonfunctional. Alteration of stream morphology (channel shape and gradient) resulting in a loss of floodplain access was noted on most impaired stream reaches. Undesirable or invasive plants such as Kentucky bluegrass, timothy and Canada thistle were often present along the nonfunctional and functional-at risk reaches as was the case with the Bender Creek and Steel Creek tributaries (reaches #1921 and #1976).

Irrigation diversions and stream dewatering on public land in the UBHW proved to be a bit of a conundrum. In some cases as with Dry Creek (reach #1906) it was obvious that diversions were limiting stream function, but in others as with Big Swamp Creek (reach #1903) and Dry Fork (reach # 1904), the impact on stream function was less clear. There was much internal discussion and debate as to whether some of these reaches were natural channels, constructed ditches or a combination of both. It appears that many if not all of these de-watered channels, ditches or altered channels existed prior to the passage of the Federal Land Policy and Management Act (FLPMA) of 1976. Pre-FLPMA ditches and canals rights-of-way are recognized under three basic authorities enacted by Congress in 1866, 1891 and 1901. As such, many of these diversions and “ditches” are outside BLM’s management control. Regardless, the IDT chose to include altered channels or ditches in the riparian inventory if they supported a fishery or if the associated vegetation was dominated by obligate and facultative wetland plants.

Figure 4: Proper Functioning Condition (PFC) Swamp Creek, Reach 1992.

Figure 5: Nonfunctional (NF) South Branch Big Swamp Creek, Reach 1966.

Two hundred and fifty-six acres or twenty-nine percent of the of the BLM wetland acreage in the UBHW are in proper functioning condition or are functional-at risk with an upward trend. Seventy-one percent the BLM wetland acreage in the UBHW are functional-at risk with static or downward trends and less than one percent of BLM wetlands are nonfunctional. Altered subsurface flow patterns and excessive hummock formation was noted on the majority of the impaired wetlands. Examples of facultative and facultative upland plants replacing obligate and facultative wetland species were common in nonfunctional and functional-at risk wetlands. Limited or no noticeable recent beaver activity has most likely contributed to the drying out of some BLM wetlands such as the Warm Springs (#1900) and Swamp Creek (#1968) wetlands.

BLM's stated objective for burning 100 acres of the Swamp Creek wetland in 1984 was to "rejuvenate moose habitat" by stimulating new willow growth. At the time BLM thought, "No additional stock control should be necessary." Unfortunately, the unprotected burn acted as a magnet for both livestock and wildlife. The resultant heavy grazing and browsing contributed to the poor resource conditions that persist today.

Evidence of old drainage ditches was noted in the Big Swamp wetland (#1967), Yank Swamp wet meadow (#1912) and North Fork wet meadow (#1915) which no doubt contributed to their drying historically and may still during periods of high water or overland flows. A more recent drainage ditch was diverting water away from Camas meadow (#1994) as was an associated road and culvert.

Forty-four of the wetlands in the Lowder Pothole Complex were determined to be functioning properly and six were determined to be functional-at risk. In spite of efforts to leave buffers of uncut trees around the wetlands, timber harvest during the mid-1980's contributed to the FAR rating on three of the potholes, due to subsequent blowdown. Plant species composition

associated with the other three FAR potholes had shifted from obligate and facultative wetland species to facultative upland and upland species.

The protocol used to assess the health of riparian and wetland habitats is described in Interagency Technical References 1737-15, *A User Guide to Assessing Proper Functioning Condition and Supporting Science for Lotic Areas* and 1737-16, *A User Guide to Assessing Proper Functioning Condition and Supporting Science for Lentic Areas*. Both documents are available at the Dillon Field Office or online at http://www.blm.gov/nstc/library/techref.htm. Streams were inventoried utilizing the 1995 Dillon Resource Area Riparian Inventory methodology as modified in 2006 and 2009. A description of this methodology is available at the Dillon Field Office. Copies of the completed riparian and wetland inventories and health assessments are housed in the UBHW project file and can be obtained by request.

Figure 6: Functional-At-Risk (FAR) North Fork Big Hole River, Reach 1923.

Figure 7 displays the condition of all BLM riparian areas in the UBHW and Figure 8 displays the condition of all BLM wetlands in the UBHW. Table 3 summarizes the condition and trend of BLM stream reaches and wetlands by allotment and presents the site-specific factors contributing to functional-at risk or nonfunctional condition ratings.

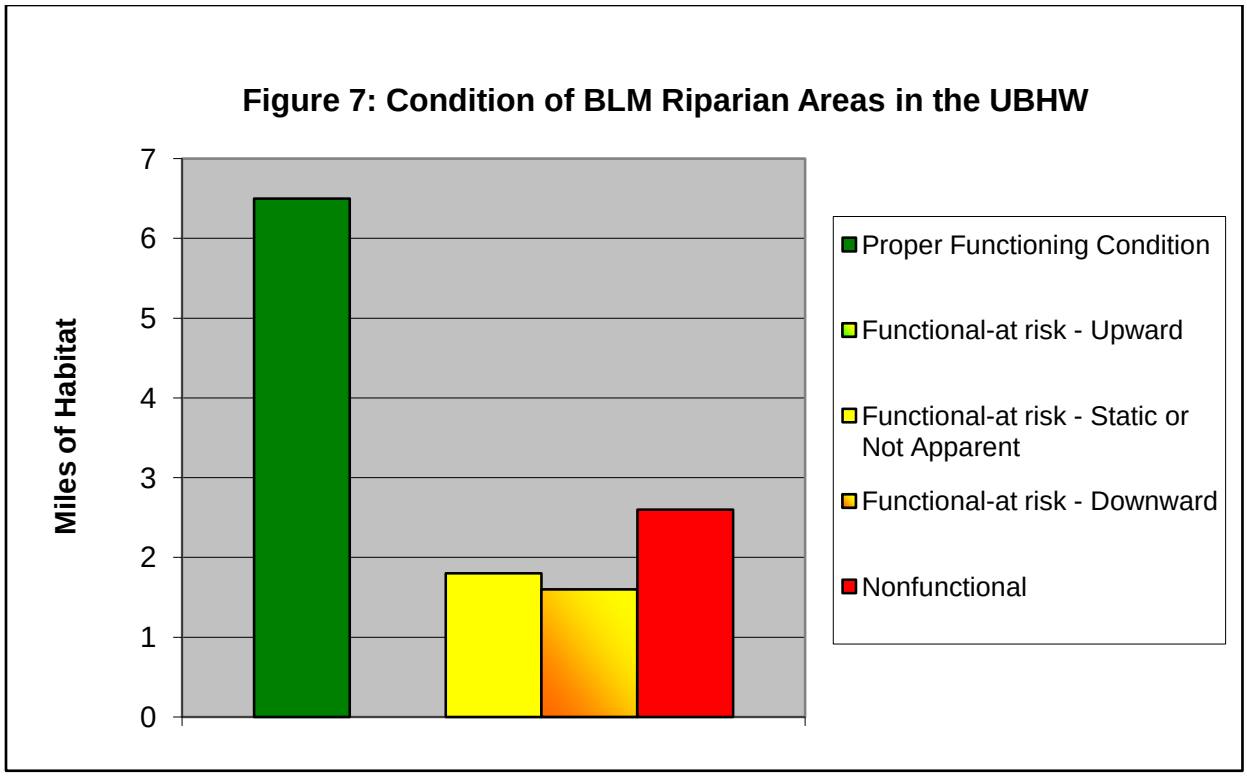
Figure 7: Condition of BLM Riparian Areas in the UBHW
Miles of Habitat
7
6
5
4
3
2
1
0
Proper Functioning Condition
Functional-at risk - Upward
Functional-at risk - Static or Not Apparent
Functional-at risk - Downward
Nonfunctional

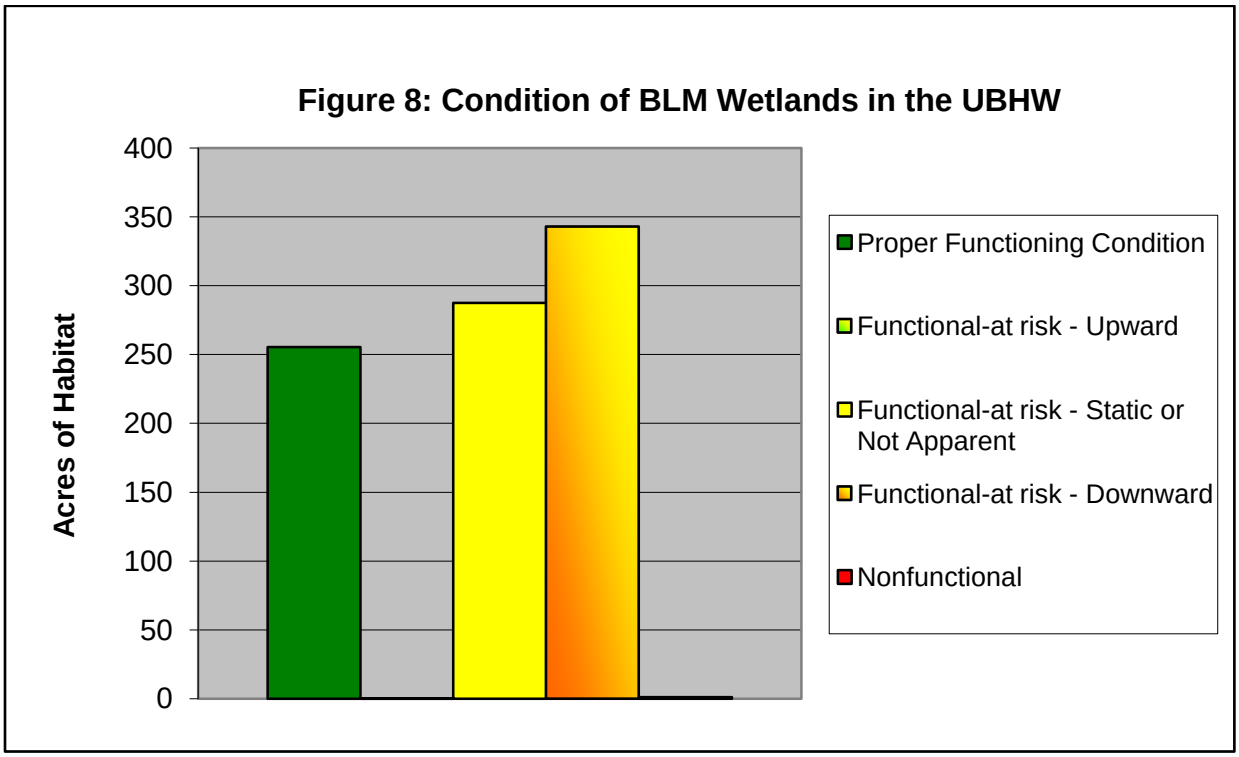
Figure 8: Condition of BLM Wetlands in the UBHW
Acres of Habitat
400
350
300
250
200
150
100
50
0
Proper Functioning Condition
Functional-at risk - Upward
Functional-at risk - Static or Not Apparent
Functional-at risk - Downward
Nonfunctional

Table 3. Riparian Area and Wetland Condition by Allotment

Allotment Stream or Wetland / Reach Number	**Miles / Acres**	**Condition & Trend ***	**Impaired Attributes / Resource Concerns ****
Doolittle Tracts			
Big Hole River / 1916	0.3 / --	PFC	--
Doolittle Wetlands / 1917	-- / 8		
Wildwood Individual			
Bender Creek Tributary / 1920	-- / 2	PFC	--
Plimpton Creek Tributary /1922	0.1 / --	FAR →	1, 3, 5
Cathouse Fen / 1999	-- / 1.5	PFC	--
Mussigbrod On & Off			
Bender Creek Tributary / 1921	0.4 / --	NF	1, 2, 3, 5, 8, 9
North Fork Big Hole			
North Fork Big Hole River / 1923	0.5 / --	FAR →	1, 3, 18
North Fork Wet Meadow / 1915	-- / 34	FAR →	6, 7, 8, 16
North Fork Wetland / 1924	-- / 23	FAR →	6, 7, 8, 16
North Fork Big Hole River / 1909	0.6 / --	FAR →	1, 3, 18
Steel Creek			
Noyes Creek / 1919	0.1 / --	PFC	1, 8
Steel Creek Wet Meadow / 1918	-- / 3	PFC	8
Steel Creek Tributary / 1976	0.3 / --	FAR →	1, 2, 3, 8
Swamp Creek – Unavailable			
North Swamp Wetland / 1925	-- / 12	NF	1, 3, 4, 5, 6, 7, 8, 9, 10
Moose Horn			
South Ruby / 1910	0.6 / --	PFC	1
Ruby Wetland / 1990	-- / 30	PFC	8
Yank Swamp Tributary / 1991	0.4 / --	PFC	--
Foxtail			
Swamp Creek / 1992	0.8 / --	PFC	--
Yank Swamp Meadow / 1913	-- / 6	PFC	--
Yank Swamp / 1914	-- / 151	PFC	--
Yank Swamp Tributary / 1911	0.5 / --	PFC	--
Yank Swamp Wet Meadow / 1912	-- / 44	FAR ↔	6, 8, 11, 16
Jumbo Mountain			
Rock Creek / 1907	1.0 / --	PFC	1
Rock Creek / 1908	1.0 / --	PFC	--
Lowder Pothole # 1 / 1926	-- / 1.0	PFC	--
Lowder Pothole # 3 / 1928	-- / 0.1	PFC	--
Lowder Pothole # 4 / 1929	-- / 0.1	PFC	--
Lowder Pothole # 5 / 1930	-- / 0.2	PFC	--
Lowder Pothole # 6 / 1931	-- / 0.3	PFC	--
Lowder Pothole # 7 / 1932	-- / 0.1	FAR →	6, 14
Lowder Pothole # 8 / 1933	-- / 0.2	PFC	--
Lowder Pothole # 9 / 1934	-- / 0.2	PFC	--
Lowder Pothole #10 / 1935	-- / 0.9	PFC	--
Lowder Pothole # 11 / 1936	-- / 0.2	PFC	--
Lowder Pothole # 12 / 1937	-- / 0.3	PFC	--

Allotment Stream or Wetland / Reach Number	**Miles / Acres**	**Condition & Trend ***	**Impaired Attributes / Resource Concerns ****
Lowder Pothole # 13 / 1938	-- / 0.4	PFC	--
Jumbo Mountain			
Lowder Pothole # 14 / 1939	-- / 0.2	PFC	--
Lowder Pothole # 15 / 1940	-- / 0.2	PFC	--
Lowder Pothole # 16 / 1941	-- / 1.0	PFC	--
Lowder Pothole # 17 / 1942	-- / 0.3	PFC	--
Lowder Pothole # 18 / 1943	-- / 0.3	PFC	--
Lowder Pothole # 19 / 1944	-- / 0.5	PFC	--
Lowder Pothole # 20 / 1945	-- / 0.3	PFC	--
Lowder Pothole # 21 / 1946	-- / 0.2	FAR →	6, 14
Lowder Pothole # 22 / 1947	-- / 0.4	PFC	--
Lowder Pothole # 23 / 1948	-- / 0.2	PFC	--
Lowder Pothole # 24 / 1949	-- / 0.5	PFC	--
Lowder Pothole # 25 / 1950	-- / 0.5	PFC	--
Lowder Pothole # 26 / 1951	-- / 0.4	PFC	--
Lowder Pothole # 27 / 1952	-- / 0.2	PFC	--
Lowder Pothole # 28 / 1953	-- / 0.2	PFC	--
Lowder Pothole # 29 / 1954	-- / 0.2	PFC	--
Lowder Pothole # 30 / 1955	-- / 0.2	PFC	--
Lowder Pothole # 31 / 1956	-- / 0.2	PFC	--
Lowder Pothole # 37 / 1978	-- / 0.2	FAR ↑	14
Lowder Pothole # 38 / 1979	-- / 0.2	PFC	--
Lowder Pothole # 39 / 1980	-- / 0.1	PFC	--
Lowder Pothole # 40 / 1981	-- / 0.2	PFC	--
Lowder Pothole # 41 / 1982	-- / 0.1	PFC	--
Lowder Pothole # 42 / 1995	-- / 0.1	PFC	--
Lowder Pothole # 43 / 1983	-- / 0.2	PFC	--
Lowder Pothole # 44 / 1984	-- / 0.1	PFC	--
Lowder Pothole # 45 / 1985	-- / 0.1	PFC	--
Lowder Pothole # 46 / 1986	-- / 0.1	FAR →	6, 7, 13
Lowder Pothole # 47 / 1993	-- / 0.1	FAR →	6, 7, 13
Lowder Pothole # 48 / 1987	-- / 0.1	PFC	--
Lowder Pothole # 49 / 1988	-- / 0.1	PFC	--
Lowder Pothole # 50 / 1996	-- / 0.1	FAR →	6, 7, 13
Dry Creek			
Dry Creek / 1906	0.3 / --	FAR ↓	7, 18
Big Lake Creek /1905	0.4 / --	PFC	18
Dry Fork / 1904	0.8 / --	PFC	15, 18
Lowder Pothole # 32 / 1957	-- / 0.4	PFC	--
Lowder Pothole # 33 / 1958	-- / 0.5	PFC	--
Lowder Pothole # 34 / 1959	-- / 0.4	PFC	--
Lowder Pothole # 35 / 1960	-- / 0.5	PFC	--
Lowder Pothole # 36 / 1989	-- / 0.1	PFC	--
Lowder Pothole # 48 / 1987	-- / 0.1	PFC	--
Camas Meadow / 1994	-- / 3	FAR ↔	4, 6, 8, 16, 17

Allotment Stream or Wetland / Reach Number	**Miles / Acres**	**Condition & Trend ***	**Impaired Attributes / Resource Concerns ****
Great Gray Wetland / 1963	-- / 9	PFC	--
Headgate Wetland / 1964	-- / 32	PFC	--
Dry Creek - Unavailable			
No riparian areas or wetlands	--	--	--
Big Swamp			
Big Swamp Creek / 1903	0.3 / --	PFC	15, 18
Big Swamp Creek Tributary / 1998	0.8 / --	FAR ↓	1, 3, 5, 9
Big Swamp Wetland / 1967	-- / 113	FAR →	4, 5, 6, 7, 8, 9, 16
Big Swamp Creek			
North Branch Big Swamp Creek / 1977	0.1 / --	PFC	--
South Branch Big Swamp Creek / 1902	0.2 / --	NF	1, 2, 3, 5, 9, 12, 18
South Branch Big Swamp Creek / 1966	0.4 / --	NF	1, 2, 3, 5, 8, 9, 12, 18
South Branch Big Swamp Creek / 1965	0.5 / --	NF	1, 2, 3, 5, 8, 9, 12, 18
Big Swamp Creek Tributary / 1997	1.1 / --	NF	1, 2, 3, 5, 9, 12, 18
Swamp Creek Wetland / 1968	-- / 343	FAR ↓	4, 5, 6, 7, 8, 9, 12
Warm Springs			
Warm Springs Creek / 1900	0.3 / --	FAR →	1, 3 6, 7, 12
Warm Springs Wetland / 1970	-- / 70		
Woody Creek / 1901	0.5 / --	FAR ↓	1, 3 6, 7, 12
Fox Gulch – unleased			
Fox Gulch / 1969	0.2 / --	PFC	--
Miner Creek – Unavailable			
No riparian areas or wetlands	--	--	--
Inabnit Butte – Unavailable			
No riparian areas or wetlands	--	--	--

*	**Abbreviations for Condition**
PFC	Proper Functioning Condition
FAR	Functional-At Risk
NF	Nonfunctional
--	Unavailable or Not Applicable

Trend for Functional – At Risk (FAR)	
↑	Upward
↓	Downward
→	Static
↔	Undetermined

**** Impaired Attributes / Resource Concerns (**factors contributing to FAR or NF calls &/or concerns noted on PFC reaches or wetlands):

1 Channel over-widened (includes trampled, sheared &/or unstable streambanks)
2 Channel downcut - headcuts present &/or vertically unstable
3 Insufficient sediment transport (excessive aggradation)
4 Altered subsurface flow patterns
5 Excessive hummock formation (abnormal hydrologic heaving)
6 Riparian area or wetland is shrinking or drying out
7 Lack of obligate wetland & facultative wetland species
8 Presence of undesirable/invasive herbaceous vegetation
9 Highlined/mushroom-shaped &/or decadent willows
10 Poor riparian tree &/or shrub recruitment
11 Conifer encroachment
12 Inactive, unstable beaver dams &/or loss of beaver activity within the last ±30 years
13 Water chemistry inhibits wetland vegetation

14 Past timber harvest (altered adjacent site characteristics)
15 Human altered or constructed channel (for irrigation)
16 Evidence of old drainage ditches
17 Road encroachment/maintenance/culverts
18 Stream dewatering

Recommendations

1. Explore opportunities to change the timing, reduce the season of use &/or provide periodic rest from livestock grazing on BLM riparian areas and wetlands where current livestock management is contributing to degraded conditions on the Big Swamp, Big Swamp Creek, Mussigbrod On & Off, North Fork Big Hole, Steel Creek and Warm Springs allotments.
2. Coordinate with Wisdom Ranger District to revise grazing management on stream reaches 1921 and 1922 that are fenced in and managed with Beaverhead–Deerlodge National Forest allotments.
3. Close the road between wetlands 1964 and 1994 and remove the culverts up drainage from these wetlands. Fill the drainage ditch at Camas meadow.
4. Explore opportunities to plug or obliterate old drainage ditches on the Foxtail and Big Swamp allotments.
5. Inventory & map the Hiker's gentian and Primrose monkeyflower populations discovered on BLM in 2009. The inventory should include the number of individual plants, a description of the habitat (e.g., associated species, soils, aspect, elevation) and an assessment of any existing and potential threats to the populations.
6. Pursue a land exchange in the Warm Springs allotment. Explore opportunities to exchange the BLM 40 acre tract in SE¼NE¼ section 20 (Land Adjustment Category 3) for the privately owned 40 acre tract in the SW¼NE¼ section 21, all in T5S, R14W or other suitable non-federal lands.

Western Montana Standard #3: Water quality meets State standards.

Background Information

The Federal Water Pollution Control Act, subsequently referred to as the Clean Water Act, as amended, and the Montana Constitution provide guidance to the Bureau of Land Management in Montana with respect to Western Montana Standard #3. The Act was amended in 1987 to address Nonpoint Source Pollution. Congress was careful to respect the authority of States to manage water. The Montana Constitution declares all surface, underground, flood and atmospheric waters within the boundaries of the state are the property of the State.

The BLM does not make Beneficial Use Determinations (BUD), which is a State responsibility. The BLM does share their findings to assist Montana DEQ in making BUDs. Montana DEQ is responsible for making decisions regarding water quality and is in the process of assessing the condition of streams, establishing reference sites, and developing water quality restoration plans. Montana DEQ has not typically assessed headwater streams, since headwater streams were not generally nominated for 303d listing.

Montana DEQ has found that Nonpoint Source (NPS) Pollution is the leading cause of surface water impairments in the State. NPS pollutants are generated by the same land uses that have

traditionally driven the state's economy, including grazing, logging, mining, roads and many other activities. (MTDEQ 2007).

The Montana Department of Environmental Quality, Water Quality Planning Bureau, Watershed Protection Section provides guidance on assessing water quality in relation to NPS. Montana DEQ recognizes PFC as a qualitative method of assessing the condition of riparian-wetland areas. Montana DEQ believes PFC can be an effective tool for riparian assessment and evaluation of the impacts of grazing management on riparian health. Montana's NPS Agricultural Strategy for Pasture and Range Lands supports the Bureau of Land Management's use of PFC for evaluating resource condition and management effectiveness.

The Montana/Dakotas Bureau of Land Management has a Memorandum of Understanding (MOU) with the State of Montana, which describes how the parties will cooperate to meet the objectives of the Clean Water Act. The MOU clarifies that Montana DEQ shall not be limited in their authority to carry out their legal responsibilities for management and regulation of water quality. The BLM agrees to share stream assessment data, identify and update the State with respect to nonpoint pollution sources. In effect, Land Health Assessments evaluate BLM's soil and water conservation practices and best management practices.

Uplands, wetlands, riparian areas, and streams are evaluated for condition. Condition is related to nonpoint source pollution. Uplands in poor condition are probable sources of sediment. Wetlands in poor condition are unlikely to filter sediment. Streams in poor condition are likely sources of channel erosion. Uplands are evaluated for land cover condition (i.e., ability of plants, rocks, and litter to protect soil from erosion and promote infiltration (i.e. reducing runoff).

Wetlands are evaluated to determine the condition and capability of wetlands to filter and infiltrate inflows. Stream morphology, streambank condition, channel width and depth, and bed materials are evaluated. Streams are classified using a combination of channel measurements and observations as well as field guides. Classifying streams provides useful information for assessing stream function, channel erosion and sediment relations.

The BLM understands that non-point source pollution needs to be addressed for waters of the State regardless of whether they are or are not meeting water quality standards and that non-degradation rules apply to waters that are meeting state water quality standards. Recognizing that Montana DEQ will not likely evaluate or list headwater streams, the BLM shares watershed assessment findings with Montana DEQ.

Affected Environment

The Upper Big Hole Assessment area used by the BLM for this assessment includes the Upper Big Hole and North Fork Big Hole TMDL Planning Areas. Pintlar Creek is the downstream limit of the TMDL Planning Unit for the Upper Big Hole.

As noted in previous sections of this report, public lands are a minor spatial component within the watershed with the majority ownership being private, Forest Service, and State Lands. Of the waters that cross public lands using the Sufficient Credible Data criteria and following the EPA approved QAPP, DEQ has assessed the Big Hole and North Fork Big Hole River, as well as

Rock, Swamp and Warm Springs Creeks. DEQ's assessment of Swamp Creek did not include Yank Swamp.

Findings and Analysis

Montana DEQ publishes a Water Quality Report (MWQR) every two years. Information in this section is based upon the 2008 Water Quality Report. Beneficial uses include agriculture, aquatic life, cold water fishery, drinking water, industrial and primary contact recreation. The following table lists level-of-use support as fully supporting, partially supporting, or not supporting. Also included are probable sources and probable causes of impairment.

Table 4: Montana DEQ 303-d listed streams within the Upper Big Hole Watershed

Name	Beneficial Uses	Probable Sources of Impairment	Probable Causes of Impairment
BIG HOLE (UPPER) RIVER, Headwaters to Pintlar Creek	Agricultural[1], aquatic life[2], cold water fishery[2], drinking water[1], industrial[1], primary contact recreation[2]	Agriculture, highways, roads bridges infrastructure (new construction), loss of riparian habitat, rangeland grazing, irrigated crop production	Temperature, low flow alterations, alteration in streamside or littoral vegetative covers
NORTH FORK BIG HOLE RIVER	Agricultural[4], aquatic life[2], cold water fishery[2], drinking water[4], industrial[4], primary contact recreation[2]	Grazing, in riparian or shoreline areas, highway/road/bridge runoff (non-construction related), loss of riparian habitat, silvicultural activities, irrigated crop production	Alteration in streamside or littoral vegetative covers, low flow alterations, sedimentation/ siltation.
ROCK CREEK	Agricultural[1], aquatic life[2], cold water fishery[2], drinking water[1], industrial[1], primary contact recreation[1]	Agriculture, grazing, in riparian or shoreline areas, loss of riparian habitat, impacts from hydrostructure flow, regulation/modifica-tion, irrigated crop produc-tion	Alteration in streamside or littoral vegetative covers, low flow alterations, nitrogen, phosphorous, physical substrate habitat alterations, sedimentation/ siltation
WARM SPRINGS	Agricultural[1], aquatic life[2], cold water fishery[2], drinking water[1], industrial[2], primary contact recreation[2]	Grazing, in riparian or shoreline areas, irrigated crop production	Alteration in streamside or littoral vegetative covers, low flow alterations, phosphorous, sedimenta-tion/siltation, TKN (Total Kjeldahl Nitrogen)

[1] Fully Supporting, [2] Partially Supporting, [3]Not Supporting, [4]Not Assessed

Section 319 of the Clean Water Act addresses non-point source pollution through the application of Best Management Practices (BMPs). Allotment Management Plans (AMPs) are recognized as BMPs to the extent that they address nonpoint source pollution (EPA 2003). The BLM uses AMPs developed to improve riparian and upland conditions as an effective BMP to improve

water quality. Western Montana Guideline #10 states: "Livestock management should utilize Best Management Practices for livestock grazing that meet or exceed those approved by the State of Montana in order to maintain, restore or enhance water quality."

Nonpoint Source Pollution from Uplands
Reiterating the uplands findings, rangeland health assessments and on-site inspections conducted on upland sites in the UBHW found all sites to be functioning properly with the exception of the forty acre Swamp Creek – Unavailable tract. The upland habitat on this tract was determined to be functional-at risk with a downward trend. Active rill formation, water flow patterns, litter movement and the amount of bare ground was moderately to much higher than expected for a shallow to gravel ecological site in the 13 – 19 inch precipitation zone. While the existing plant association still typed to a Mountain big sagebrush / Idaho fescue shrubland, poor vigor and production of the cool season bunchgrasses as well as the presence of spotted knapweed and cheatgrass contributed to the functional-at risk rating.

Nonpoint Source Pollution associated with Streams and Riparian Areas
Six and one half miles or fifty-two percent of the BLM riparian areas in the UBHW are in proper functioning condition. Forty-eight percent of the BLM riparian areas are functional-at risk with static or downward trends or nonfunctional. Alteration of stream morphology (channel shape and gradient) resulting in a loss of floodplain access was noted on most impaired stream reaches.

Irrigation diversions and stream dewatering on public land in the UBHW were observed, however determination of impacts was not a black or white process. In some cases it was obvious that diversions were limiting stream function, but in others the impact on stream function was less clear. Many of the diversions and "ditches" are outside BLM's management control.

Two hundred and fifty-six acres or twenty-nine percent of the of the BLM wetland acreage in the UBHW are in proper functioning condition or are functional-at risk with an upward trend. Seventy-one percent the BLM wetland acreage in the UBHW are functional-at risk with static or downward trends and less than one percent of BLM wetlands are nonfunctional.

For additional information, refer to the upland and riparian health sections for PFC determinations and for indications as to whether these resources are contributing to water quality impairment. Field observations for other streams are found in the riparian section of this document

Recommendations

Many of the recommendations under the previous Upland and Riparian Health sections would also improve water quality. In addition to those recommendations see the following items.

1. Continue working with Montana DEQ and local Watershed Committees in the development and implementation of water quality restoration plans.
2. Continue to implement and evaluate Best Management Practices to address NPS pollution and make adjustments as necessary.
3. Continue to share Watershed Assessment findings with DEQ.

4. Revise AMPs to mitigate riparian and upland resource concerns. In addressing these concerns, nonpoint source pollution will be addressed. (Specific allotments are noted in the Upland and Riparian Health sections.)

Western Montana Standard #4: Air quality meets State standards.

Background Information

The Environmental Protection Agency (EPA) has delegated the authority to implement the provisions of the Clean Air Act to the State of Montana. Determination of compliance with air quality standards is the responsibility of the State of Montana. Air quality is in attainment or is not in attainment. Montana DEQ identifies non-attainment areas. Conformance with the standard is determined by researching DEQ air quality information sources (non-attainment areas). Smoke from wildland fire and prescribed fire results in temporary violation of air quality standards. In the case of wildfire, sources may be several states distant (e.g., California, Oregon, Washington). To address the issue of wildland fire, the EPA developed the 1998 Interim Air Quality Policy for Wildland and Prescribed Fires which required states to develop smoke management plans. Montana and Idaho responded by forming the Montana/Idaho Airshed Group, with which the Bureau of Land Management is actively involved, and by developing the Montana/Idaho Smoke Management Program.

The Clean Air Act of 1990 as amended (42 U.S.C. 7401 et seq) and Executive Order 12088 requires the BLM to work with appropriate agencies to protect air quality, maintain Federal and State designated air quality standards, and abide by the requirements of State Implementation Plans.

Affected Environment

The UBHW is located within the Montana/Idaho Airshed Management Area. The UBHW forms a sort of subairshed as air movement is determined by the Big Hole watershed itself. The watershed is sparsely populated. In terms of risk assessment to human health, the largest population centers are Jackson and Wisdom, with 2000 Census estimates of 134 and 308 respectively.

The 1977 Amendments to the Clean Air Act resulted in the development of Air Quality Classes under the provisions of Section 160, Prevention of Significant Deterioration. The UBHW is located within a Class II airshed.

The 1998 Interim Air Quality Policy for Wildland and Prescribed Fires requires states to develop smoke management plans. The Montana/Idaho Airshed Group developed the Montana/Idaho Smoke Management Program. Prescribed burning is done in accordance with the Montana/Dakotas Fire Management Plan and is coordinated with MT DEQ and the Montana/Idaho Airshed Group. During prescribed fire season, the Smoke Monitoring Unit supports the Montana/Idaho Airshed Group to prevent or reduce the impact of smoke on area communities–especially when that smoke could contribute to a violation of national air quality standards. During the summer wildfire season, the Smoke Monitoring Unit assists state and local governments in monitoring smoke levels and providing information about smoke to the public, firefighters, and land managers.

Findings and Analysis

Air quality issues in the planning area center mainly around smoke. Smoke contributors in the planning area include wildfire, prescribed fires, private debris burning, agricultural burning, slash burning, and wood burning stoves and fireplaces. Wildfire can produce short-term adverse effects on air quality. Air quality and visibility can deteriorate due to temporary air stagnation during wildfire events, which are most common during the months of July, August, and September. Concerns regarding human health revolve around smoke from wildland and prescribed fire.

For the major part of the year the Air Quality Standard is met throughout southwest Montana including the Upper Big Hole Watershed assessment area, but can become an issue during wildfire season. However, generally all of southwest Montana meets or exceeds all National Ambient Air Quality Standards.

Recommendations

1. 1. Continue to develop and follow Burn Plans and to coordinate with the Smoke Monitoring Unit.

Western Montana Standard #5: Provide habitat as necessary, to maintain a viable and diverse population of native plant and animal species, including special status species.

Background Information

This Standard is an overall assessment of biodiversity and plant and wildlife habitat. The present state of each allotment and habitat type was compared to the natural and historic condition. The indicators described under the definition of Standard #5, as well as condition/function of the other standards, specifically uplands and riparian, were considered to determine whether or not the Habitat Standard was met.

Affected Environment

Special Status Species

"Special Status Species" refers to both plants and animals and includes proposed species, federally listed, and candidate species under the Endangered Species Act, State-listed species, and BLM State Director-designated sensitive species (USDI 2001c). Special status species are vital to maintain the biodiversity in the watershed. Table 5 lists all special status wildlife species that occur within the UBHW during all or part of the year. BLM sensitive plant species known from the UBHW are presented under "Unique and/or Rare Native Plants" in the upland and riparian/wetland sections discussed above.

Table 5. Special Status Wildlife Species Occurring Within the Watershed

List of all Special Status Species that are known to occur within the watershed.	Current Management Status of the Species.	Occurrence: Resident (R) Transient (T)	Preferred habitat
Canada Lynx	Threatened	T	Sub-alpine forest
Grizzly Bear	Threatened	T	Forest
Bald Eagle	Sensitive	R	Riparian/wetland
Black-backed Woodpecker	Sensitive	R	Forest
Black Tern	Sensitive	R	Wetland
Brewer's Sparrow	Sensitive	R	Sagebrush shrubland
Bobolink	Sensitive	R	Grassland
Boreal/Western Toad	Sensitive	R	Riparian/wetland/forest
Burrowing Owl	Sensitive	T	Sagebrush shrubland /grassland
Ferruginous Hawk	Sensitive	R	Sagebrush shrubland
Fisher	Sensitive	T	Forest
Flammulated Owl	Sensitive	R	Forest
Fluvial Arctic Grayling	Sensitive	R	Rivers
Franklin's Gull	Sensitive	T	Wetland
Fringed myotis	Sensitive	T	Grassland/woodland
Golden Eagle	Sensitive	R	Riparian/wetland Sagebrush shrubland
Gray Wolf	Sensitive	R	All
Great Basin Pocket Mouse	Sensitive	R	Sagebrush shrubland
Great Gray Owl	Sensitive	R	Forest
Greater Sage Grouse	Sensitive	R	Sagebrush shrubland
Long-billed Curlew	Sensitive	R	Grassland
Long-eared Myotis	Sensitive	R	Grassland/woodland
Long-legged Myotis	Sensitive	R	Forest/ Riparian
North American Wolverine	Sensitive	T	Sub-alpine forest
Northern Goshawk	Sensitive	R	Forest
Northern Leopard Frog	Sensitive	R	Riparian /wetland
Peregrine Falcon	Sensitive	R	Riparian/ Wetland
Pygmy Rabbit	Sensitive	R	Sagebrush shrubland
Sage Sparrow	Sensitive	R	Sagebrush shrubland
Sage Thrasher	Sensitive	R	Sagebrush shrubland
Swainsons Hawk	Sensitive	R	Wetland
Three-toed Woodpecker	Sensitive	R	Riparian/wetland Sagebrush shrubland
Townsend's Big-eared Bat	Sensitive	R	Forest
Westslope cutthroat trout	Sensitive	R	Streams

R= species spends all or a major portion of its life cycle in the watershed.
T = species migrates through or habitat may not support resident populations.

The Big Hole Valley is identified as a linkage zone for Canada Lynx between the Beaverhead Mountain Range and the Pioneers Mountains; however USFWS has not identified Beaverhead County as a county where lynx is reasonably expected to occur. Canada lynx habitat is

characterized by cool moist subalpine fir, Englemann spruce and moist lodgepole pine and Douglas fir forests with deep winter snow. Aspen contribute to lynx habitat where it is intermingled with Englemann spruce or lodgepole pine. Snowshoe hare are the primary winter prey for lynx and winter snowshoe hare habitat is a limiting factor for lynx persistence. Winter snowshoe hare habitat consists of early succession, dense, young regenerating forests or multistory forests that have trees whose limbs come down to snow level and have an abundance of trees in the understory (2500-5000 stems/acre). In contrast, late succession mature stands are required for lynx denning habitat.

The entire UBHW provides habitat for gray wolf. The gray wolf population in the Northern Rocky Mountains (NRM) has exceeded recovery goals every year since 2002. The NRM distinct population segment (DPS) of the gray wolf was de-listed on May 4, 2009. They are currently managed by Montana fish, Wildlife & Parks (MFWP) under cooperative agreements with the USFWS. MFWP continues to be the lead agency for wolf management activities in Montana.

No occupied grizzly bear habitat occurs in the UBHW and is outside of the Greater Yellowstone Primary Conservation Area (PCA). The Beaverhead Mountains serve a linkage corridor for grizzly bears between the Greater Yellowstone PCA and the Bitterroot, Cabinet Yaak and Northern Continental Divide (NCDE) Ecosystems. The greater Yellowstone DPS was de-listed in March 2007 and re-listed as threatened on September 21, 2009 under a Federal District Court order. The NCDE is believed to have the largest population of grizzly bears in the lower 48 states, the Cabinet Yaak Ecosystem is currently under a five year review process for de-listing and grizzly bears do not currently occupy the Bitterroot Ecosystem.

Mountain big sagebrush is the dominant shrubland habitat type in the UBHW and supports a diversity of sagebrush-dependent wildlife species. This habitat summer and fawning/calving habitat for mobile wildlife species such as elk, mule deer, pronghorn antelope, migratory song birds and a host of raptors. For further discussion on sagebrush habitat, see the upland section under Western Montana Standard #1.

Sage grouse populations and sagebrush habitats have declined throughout the west due to significant habitat losses range-wide from wildfire and prescribed fire, habitat conversion for agricultural needs and urban growth, and livestock grazing. Brood rearing habitats require a mix of forbs and insects for a high protein diet, usually in association with riparian habitats. Winter diets consist of almost 100% sagebrush. Previous petitions for listing the sage grouse under the ESA emphasize the need for region-wide assessments addressing habitat conditions and population stability. This emphasizes the importance of maintaining the integrity of mid- to late-seral sagebrush habitats on public lands, not only for sage grouse but for all sagebrush obligate species

The Partners in Flight Bird Conservation Plan for Montana was prepared “to focus on restoring healthy ecosystems that will sustain productive and complete bird communities” (Montana Partners in Flight, 2000), and identified 141 species for priority status in five habitat groups. Most of these birds are summer residents that use habitats ranging from lower elevation wetlands to high elevation forests for breeding and raising young. Some species are migratory but small

populations may be present yearlong depending on seasonal conditions. The USFWS has also identified a list of 28 "Birds of Conservation Concern" for the Rocky Mountain Region. Thirteen of these species have been documented to occur within the UBHW year round or seasonally. Seven of these species are also on the BLM sensitive species list.

Table 6. USFWS Birds of Conservation Concern documented in the UBHW

Swainson's hawk*	Pygmy nuthatch	Wilson's phalarope
Golden eagle*	Brewer's sparrow*	Flammulated owl*
Prairie falcon	Ferruginous hawk*	Lewis' woodpecker
Long-billed curlew *	Peregrine falcon*	Red-naped sapsucker
Williamson's sapsucker		

*Species is also listed as BLM sensitive

The UBHW covers portions of Hunting Districts (HD) 321, 329, and 332 for deer and elk. HD 318 for antelope, HD 302, 323, 326 and 327 for moose, HD 316 for Black bear and HD 223, 312 and 322 for mountain goat. BLM lands provide seasonal habitat for all of these game species in the UBHW except for mountain goats. Table Q shows the primary game species found in the UBHW and the habitat used throughout the year.

Table 7. Primary Game Species and Habitat Use Within the UBHW

Species	Forested	Sagebrush	Riparian
Antelope		S,C	
Black bear	Y	S	S
Blue grouse	Y	S,B	Y
Elk	S,C	S,C	S
Moose	Y	Y	Y
Mountain lion	Y		Y
Mule deer	S,C	Y	
Sage grouse		Y	B
White-tail deer		S	Y

Y=yearlong, W=winter, S= summer, C=calving/fawning, B=breeding/brooding

Historically, westslope cutthroat trout (WCT) were found in most of the perennial streams within the UBHW. Competition with non-native eastern brook trout, hybridization with non native rainbow and Yellowstone cutthroat trout, as well as habitat degradation have combined to extirpate pure populations of WCT from most of their historic habitat within the Big Hole Drainage. The WCT in Montana is currently listed as a special status species by the State, Forest Service and BLM.

Currently, Woody Creek supports the only population of westslope cutthroat trout located on public land in the assessment area. Several streams within the greater Big Hole drainage contain populations of pure or slightly hybridized (90% or greater), but are not found on public land. To meet management criterion, a population of WCT must consist of individuals that are genetically at least 90% WCT.

Historically fluvial arctic grayling were found throughout the upper Missouri River system from Great falls upstream. Today the upper 1/3 of the Big Hole River supports the last native self-sustaining population of strictly fluvial arctic grayling in the lower 48 states. Fluvial arctic grayling are a Montana Species of Special Concern. The current distribution of this species represents less than 5% of its historic range. Historically many of the tributaries to the Big Hole supported at least seasonal use. Today, grayling are primarily restricted to the main stem of the Big Hole River with limited use of short stretches of some tributary streams.

Shells from Montana's only coldwater trout stream mussel, the western pearlshell, were observed on BLM stream reaches 1909 and 1923 (North Fork Big Hole River) during riparian and wetland inventories. Populations of this mussel on the east side of the divide in Montana followed the historic distribution pattern of WCT. Once widespread through the upper Missouri River Drainage, only remnant populations remain within the UBHW in the Big Hole River and some of its tributaries. The western pearlshell currently has no special management status under BLM, but is listed as a special status species by MFWP and the USFWS.

BLM sensitive plant species known from the UBHW are presented under "Unique and/or Rare Native Plants" in the upland and riparian/wetland sections discussed above.

Forest and Woodland Habitat, Forest Health and Fuels Management

Forested habitats comprise of approximately 53% of the UBHW, and approximately 55% of BLM-administered public lands within the UBHW, according to satellite imagery. The close association of much of this forested habitat with adjoining sagebrush and riparian habitats supports a broad array of wildlife species. This habitat provides security cover for big game species and migration corridors between seasonal habitats.

BLM administered lands, as well as surrounding forested private, state, and Forest Service land, are experiencing low to moderate levels of mortality from insects and disease, however, this is expected to increase due to overstocking and favorable stand conditions. Conifer expansion into openings, sagebrush/grasslands, and aspen/woodlands are most evident at the low to mid-elevations of the assessment area. Mid-elevation forests are diverse mixed conifer, closed canopy stands dominated by lodgepole pine and Douglas-fir. Other species present include Englemann spruce, subalpine fir, a few scattered ponderosa pine, and numerous aspen stands. Whitebark and limber pine are both major components found in the higher forested elevations, typically USFS managed grounds, of the UBHW.

Several insects and diseases are found affecting forest habitats of Southwestern Montana. Only the most damaging agents affecting the UBHW area are described below with their host species.

<u>Lodgepole Pine</u>

Lodgepole pine is the most common tree species found on BLM in the UBHW. Mature stands average 100+ years and the majority of regeneration is 50 years or less as a result of past management activities and wildfire. This has led to a mosaic of age classes in areas where activities were concentrated such as in the Rock Creek area. Several areas of the UBHW had a high hazard rating for Mountain Pine Beetle (MPB). Stands most susceptible to attack from MPB are pure, mature lodgepole pine that are densely stocked (Sturdevant 2009). The MPB is a

native insect to western pine forests found in North America and endemic population levels are almost always present in host stands (Thompson 2009). Larger diameter (greater than 8 inch DBH) lodgepole pines are usually targeted by the beetle because of the thick layer of phloem which provides an adequate food source while populations build. After the larger trees of a stand have been killed off, beetles will infest smaller diameter trees (Amman et al. 2002). Trees as small as 3 inch DBH on the Helena NF were reported as being infested in the current outbreak (N. Sturdevant, pers. comm., 2009). Beetle populations then decline to endemic levels in the host stand (Amman et al. 2002). Areas noted with increasing MPB activity included Warm Springs, Fox Gulch Unleased, North Fork Big Hole, and Moosehorn allotments.

In areas that were harvested or burned, the lodgepole has re-established in three years or less. Trees per acre ranged from 300-800 in harvest units and were estimated to be 3 or 4 times that in the areas that had been burned by wildfire and were salvage harvested. These areas of regeneration have resulted in an age class mosaic. These areas provide hiding cover for big game and other wildlife species as well as corridors from harvested or burned areas to adjacent stands (Figures 9 & 10).

Figure 9: ID Team members in approximately 24 year old lodgepole pine regeneration following timber harvest. Yank Swamp Timber Sale, Foxtail Allotment, February 2009.

Figure 10: ID Team in approximately 9 year old lodgepole pine regeneration where wildfire & salvage harvest occurred. Mussigbrod Fire Salvage, Wildwood Individual Allotment, August 2009.

Douglas-fir

Douglas-fir is expanding into several areas of the UBHW that are currently sagebrush/grassland habitat types and aspen woodlands. Trees found in areas of moderate to high levels of expansion were typically less than 65 years old. Conifer expansion into sagebrush/grassland was most evident in the Steele Creek allotment. All aspen woodlands visited in the UBHW during the assessment were noted as experiencing moderate to high levels of conifer expansion.

Figure 11: Douglas-fir expansion into sagebrush/grassland. Steele Creek Allotment, September 2009.

Figure 12: Douglas-fir expansion into aspen woodlands. Steele Creek Allotment, September 2009.

Forested areas dominated by Douglas-fir are primarily mature stands that average 125+ years and are considered high risk for Douglas-fir beetle outbreaks. Douglas-fir beetle, a native bark beetle, is currently at endemic population levels in the UBHW. At low or endemic levels, mortality is typically found in scattered larger diameter Douglas-fir growing in mixed or pure stands that have been stressed due to drought, windfall, fire scorch, defoliation, or root disease (Schmitz and Gibson 1996; Weatherby and Their 1993). Douglas-fir trees most susceptible to attack from Douglas-fir beetle are those larger than 14" DBH, older than 120 years, and growing in dense stands (Weatherby and Their 1993). In areas where susceptible trees are abundant, populations can build and spread rapidly to adjacent trees (Schmitz and Gibson 1996). Stands observed during the assessment with current Douglas-fir beetle activity were located in the Fox Gulch Unleased parcel and on lands adjacent to Miner Creek Unavailable parcel.

Figure 13: Area of recent windfall, surrounding Douglas-fir stand aged at 230+ years old. Fox Gulch Unleased Parcel, September 2009.

Figure14: Same stand showing mortality from bark beetles near the area in Figure 13. Fox Gulch Unleased Parcel, September 2009.

Quaking Aspen

Scattered aspen stands can be found throughout the assessment area. Quaking Aspen is the most widely distributed tree species in North America and is considered a keystone species critical for

maintaining biodiversity in western landscapes (Jones et al. 2005). Aspen is a mid-elevation shade intolerant species which grows in pure forests and in association with conifer and other hardwood species. The understory of the canopy provides a diverse and critical habitat for many wildlife species, valuable grazing resources, and protection for soil and water (Bartos and Shepperd 2006). Aspen are a unique species because they reproduce primarily by suckering from the parent root system. Regular disturbances such as fire and avalanches, or dieback caused by disease and insect infestations are generally needed to promote regeneration in aspen stands (Bartos and Campbell Jr. 1998, Thompson 2009).

Concern was noted regarding the reproductive capability and recovery of aspen. Several of the allotments had mature aspen, but very few had sufficient aspen regeneration. In most cases where it was present, browse pressure seemed to be a contributor in the ability of seedlings to grow above browse height. Many of these areas were also experiencing mortality of the mature overstory aspen. This may be a result of competing with conifers- aspen are very shade intolerant, or the removal of fire from the landscape (Figure 15), but could also be related to the condition known as Sudden Aspen Decline (SAD) (Rehfeldt et al. 2009, Burns 1990).

Figure 15: Aspen skeletons with evidence of past fire. Limber pine and Douglas-fir were establishing in many of these areas, Douglas-fir above was aged at 60 years old. Steele Creek Allotment, September 2009.

Sudden Aspen Decline is characterized by the rapid mortality of the mature overstory of aspen clones. Affected stands have little or no regeneration associated with them. Studies to date have suggested that this disease is drought-driven with predisposing factors which include; low elevation, south and southwest aspects, droughty soils, open stands, and physiological maturity (Thompson 2009).

Figure 16: Current aspen conditions in the UBHW. Note the conifer in the understory and overstory, as well as aspen skeletons on the ground and lack of regeneration present. Foxtail Allotment, August 2009.

Stressed aspen are also being negatively affected by the Cystospora canker, which causes cankers, lesions, or bark necrosis and kills by girdling the affected area, as well as two beetle species, the poplar borer and bronze poplar borer (Thompson 2009, Burns 1990). Both species may not kill larger trees, but the trunk or branches become weakened and may be girdled causing the tree to be susceptible to wind damage. This allows for the introduction of disease pathogens and results in the decline of the tree. Smaller trees can be killed by the girdling effect of numerous galleries in the trunk (Sedbrook 2009, Solomon 1995).

In the allotments where aspen regeneration was noted, Wildwood Individual had the only regeneration that was above browse height. In 2003, the BLM completed a salvage harvest in portions of this allotment following the Mussigbrod fire of 2000. There were areas where slash from the harvest operation and other woody debris were pushed against the remaining few standing mature aspen (Figures 17 & 18). This was an experimental procedure to see what the aspen response would be. In these areas, the regeneration over a 3 year time period (2006-present) had approximately doubled in height and in number and was experiencing low levels of browse pressure where slash protected the emerging sprouts.

Figure 17: Aspen with slash in Wildwood Allotment, October 2006;

Figure 18: Same aspen in Wildwood Allotment, August 2009.

Ponderosa Pine

The UBHW boundary lies at the easternmost edge of the native range in Southwestern Montana for ponderosa pine, which is distributed as far south as Mexico, throughout the western U.S., and into Canada (Figure 19). Ponderosa pine has been classified as absent in the southwestern region of Montana. This could be explained by the low distribution of rainfall during the summer months; soil moisture is the most often variable to limit growth. The lack of moisture may also prevent seedling establishment, except at higher elevations, where the species has little tolerance for the shorter growing season (Burns 1990). A few scattered mature ponderosa pine were found on BLM administered land in the Jumbo Mountain and Dry Creek allotments. One mature tree was aged during the assessment and was approximately 155 years old, putting the birth year in the mid 1850s. Of the ponderosa pine found, only two trees were smaller diameter co-dominant trees (8-10 inch DBH), and no seedlings or saplings were noted at any of the sites. This may indicate localized extinction (R. Means, pers. comm., 2009).

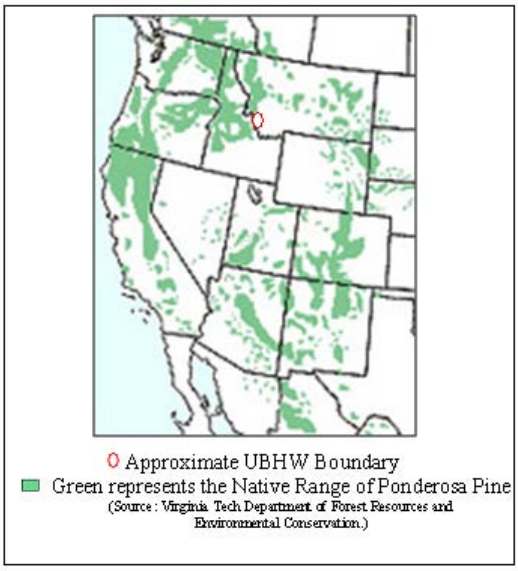

Figure 19: Native Range of Ponderosa Pine in North America.

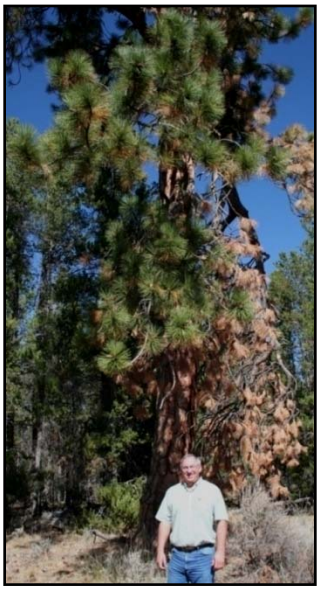

Figure 20: BLM employee next to a 150+ year old Ponderosa Pine. Dry Creek Allotment, August 2009.

In areas surrounding the UBHW, ponderosa pine is experiencing high levels of mortality due to mountain pine beetle and western pine beetle outbreaks. Both species usually attack the larger diameter trees, but may attack ponderosa down to 5 and 6 inch DBH, respectively. Trees are killed when they become girdled by the larvae and adults feeding on the phloem layer of the inner bark. Attacked trees will fade the following year (Hagle et al. 2003). No bark beetle activity was noted in ponderosa pine during the assessment, but these trees are susceptible to attack from MPB which is present in adjacent lodgepole pine stands.

Whitebark Pine and Limber Pine

No whitebark pine and only a few young limber pine were noted during the assessment on BLM-administered land. Both species can be found growing more abundantly at higher elevations of the UBHW.

Whitebark pine is most commonly found on warm aspects and ridgetops that have direct exposure to both wind and sun. It is a slow growing and long-lived tree of high elevations. Seeds from whitebark are an important food source for wildlife species such as the grizzly bear and other wildlife species of the high mountains (Burns 1990).

Limber pine is found in both lower and upper elevation forests and anywhere in between on dry, windswept sites. The varying range of elevation for this species is a result of its adaptability (Burns 1990).

Limber pine and whitebark pine are being affected and killed by mountain pine beetle and/or white pine blister rust. Whitebark pine is declining rapidly across many parts of its range due to the combined effects of the exotic white pine blister rust, the native mountain pine beetle, and the exclusion of fires (Arno 1986, Kendall and Keane 2000, Tomback et al. 2000).

Historical Fire Regimes

Fire exclusion, caused primarily by fire suppression and the removal of fine fuels by livestock grazing in the area since the 1870's, has changed the structure, density, and plant species composition within the UBHW. The need for and subsequent harvesting of forest products to support mining and agricultural activities in the late 1800's and early 1900's also greatly affected forest distribution, species composition and structure.

The change in forest structure, as well as the increase of insect and disease activity, leads to a higher likelihood of high-intensity fires occurring in areas that historically experienced more frequent low-intensity fires. Due to increasing fuel continuity, fires are also more likely to be of significantly greater size than those which historically occurred. Large-scale, high-severity fires present risks to human life and property, watershed stability and fish and wildlife habitat.

In fire adapted ecosystems, recurrent fire is the dominant disturbance that affects vegetation patterns. One method to describe this disturbance is using historical fire regimes (Table 8). The fire regime concept is used to characterize the personality of a fire in a given vegetation type, how often it visits the landscape, the type of pattern created, and the ecological effects. The historical fire regimes for the watershed are arranged based on fire severity and fire frequency.

Table 8. Historical fire regimes for Forested BLM-administered lands within the UBHW.

Historical Fire Regime	Severity (% Overstory Replacement)	Fire Interval (Years)	BLM Acres	% of BLM Forested	Representative Ecosystem
NL – non-lethal	low - <20%	10 to 25	354	11%	Conifer encroachment
MS1 – mixed severity, short interval	low - 20-30%	20 to 40	176	6%	Lower elevation conifer forests
MS2 – mixed severity, long interval	mod - 30-80%	40 to 120	194	6%	Shrublands, mixed conifer forests
MS3 – mixed severity, variable interval	variable - 10-90%	45 to 275	22	<1%	Higher elevation conifer forests
SR1 – stand replacement, short interval	high - >80%	95 to 180	2048	65%	Certain lodgepole pine, dry Douglas-fir forests
SR2 – stand replacement, long interval	high - >80%	200 to 325	347	11%	Higher elevation spruce-fir forests

* Acreage discrepancies may occur through calculations made in GIS.

Noxious Weeds and Other Invasive Plants

Spotted knapweed, one of the more aggressive noxious weeds in the area administered by the Dillon Field Office, is found scattered in small infestations throughout the Big Hole Valley, primarily along roads and in other disturbance areas. Because of where it is found, the potential is high for knapweed to be spread by vehicles, livestock, wildlife, recreation and other activities.

Other noxious weeds found in the watershed are: Canada thistle, a colony forming perennial with deep and extensive horizontal roots and Musk thistle, a biennial that spreads rapidly forming dense stands which crowd out desirable forages. In the summer of 1996 five St. Johnswort plants were found and treated along the Twin Lakes road near Dry creek. Annual inventory in this area since 1996 has not detected any additional St. Johnswort plants.

Since 1989, BLM has been involved in cooperative control efforts with Beaverhead County. Throughout this period, the goal has been to prevent new noxious weed infestations and control or eradicate existing infestations within the county using Integrated Pest Management. In 2006 the BLM, Beaverhead, Ravalli and Lemhi counties, and other agencies became involved in the Continental Divide Barrier Zone project, the goal of which is to set up a network between all these entities that will better facilitate an Early Detection, Rapid Response (EDRR) strategy towards any new invasive weed threatening the area. As part of this project Beaverhead county hired a private contractor to inventory the Continental Divide Trail from the Centennial valley to Chief Joseph pass. The contractor was to search for any invasive weeds that were within a 100 yard area on either side of the trail. No noxious weeds were found within the area surveyed.

Less than two acres per year have been treated with herbicide from 2001 through 2009 with one thousand acres being inventoried yearly over this same time span. Due to the small size of the

spotted knapweed infestations, the harshness of the climate and the elevation of the valley, no biological controls have been released.

Riparian, Aquatic and Wetland Habitat and Associated Species

The Big Hole River drainage provides habitat for an array of native and non native species. Within the assessment area species such as arctic grayling, WCT, rainbow, brown, brook, cutthroat trout hybrids as well as mountain whitefish, white sucker, longnose sucker, longnose dace, mottled sculpin, stone cat, carp, can be found residing in various degrees of abundance.

Non-native species were introduced into the area in the late 1800's and early 1900's. Brook trout are the most common salmonid found in the assessment area occurring in most perennial waters capable of supporting cold water species. Rainbow trout and hybrid cutthroat are incidentally to commonly found in the lower to middle reaches of several streams.

Within the UHBW there are 13 perennial streams on public land that support cold water fish populations. Common sport fish species in the area are brook, brown and rainbow trout, rainbow x cutthroat hybrids and mountain whitefish. Table 9 describes the streams and species they support.

Table 9. Fisheries Stream and Fish Species Present in UBHW

Stream	Species Present
Big Hole River	Arctic grayling, rainbow, brown, brook trout, mountain whitefish, mottled sculpin, white sucker, longnose dace, mountain sucker and burbot
North Fork Big Hole River	Arctic grayling*****, rainbow, brown, brook trout, mountain whitefish, mottled sculpin, white sucker, longnose dace, mountain sucker and burbot
Yank Swamp Creek	Brook trout
Swamp Creek	Arctic grayling*****, rainbow, brown, brook trout, mountain whitefish, mottled sculpin, white sucker, longnose dace, mountain sucker and burbot
Big Swamp Creek	Brook trout, Rainbow trout, longnose sucker, mottled sculpin and rainbow x WCT hybrids.
North Branch Big Swamp Creek	Brook trout, Rainbow trout, longnose sucker, white sucker, longnose dace, mottled sculpin and rainbow x WCT hybrids.
South Branch Big Swamp Creek	Brook trout, rainbow trout, longnose sucker, mottled sculpin and rainbow x WCT hybrids.
South Branch Big Swamp Creek Trib	Brook trout, rainbow trout, longnose sucker and mottled sculpin
Big Lake Creek	Arctic grayling*****, brook trout, rainbow trout, longnose sucker, white sucker, longnose dace, mottled sculpin and Rainbow x WCT hybrids.
Rock Creek	Rainbow, brown, brook trout, mountain whitefish, mottled sculpin, white sucker, longnose dace, mountain sucker, burbot and rainbow x WCT hybrids

Stream	Species Present
Dry Creek	Brook trout, rainbow, mottled sculpin and longnose dace
Warm Springs Creek	Arctic grayling*****, brook trout, rainbow trout, mountain whitefish, burbot, longnose sucker, white sucker, longnose dace, mottled sculpin, rainbow x WCT hybrids and Yellowstone cutthroat x WCT hybrids.
Woody Creek	WCT (98%) and brook trout

*****To date arctic grayling have only been found short distances upstream of the main stem of the Big Hole River in these tributary streams and are not found throughout the drainage (Per con MFWP, Jim Magee 10/6/2009).

The UBHW provides habitat for four species of amphibians (Long Toed Salamander, Rocky Mountain tailed frog, Columbia Spotted Frog and the Western Toad) and three species of reptiles (Rubber Boa, Terrestrial, and Common Garter Snakes).

Findings and Analysis

Special Status Species

Grizzly bear transients may occur in the watershed and unconfirmed sightings are reported on occasion, but there are no known grizzly territories established in theUBHW. Most of the suitable habitat for Grizzly bears in the UBHW occurs on Forest Service lands. Due to the substantial size of the home ranges of large carnivores and the small tracts of BLM lands in the UBHW, habitat on BLM is limited.

Minimal snowshoe hare sign was documented in the lodgepole pine clearcut regeneration on BLM lands within the watershed. The clear-cuts on Jumbo Mountain, Foxtail and Yank Swamp allotments that were completed in the late 1980's and 1990's do not have enough regeneration to provide high quality foraging habitat. Following the Mussigbrod wildfire in 2000, lynx denning structures were constructed in the salvage sale units. These structures do not appear to have been used by Canada lynx to date. The regeneration in the Mussigbrod fire has 3-4 times as many stems per acre of lodgepole pine than is found in the clear cuts from the mid 80's and 90's. Existing BLM habitat is not large enough to support a viable lynx analysis unit (LAU) (an area the size of a female lynx home range, 10-20 sq miles). Potential Canada lynx habitat is limited on BLM lands in the UBHW due to the small amount of public lands administered by BLM.

Approximately four wolf packs have been established in the UBHW during recent years. Wolves that have continue to predate on livestock will continue to be removed. Hunting seasons for gray wolves were put into place by MFWP in 2009 in Southwest Montana. Due to most of the big game migrating out of the Big Hole valley in winter, with the exception of moose and a few mule deer and white-tailed deer, livestock depredations are inevitable.

Sagebrush Habitats and Sagebrush Dependent Species

Antelope populations within the UBHW are on the increase (V. Boccadori and C. Fager, pers. comm., 2009). Due to extreme weather conditions, antelope migrate out of the Big Hole Valley and winter in the Grasshopper valley. Fences can hinder wildlife movements or result in mortality to wildlife especially big game, raptors and upland game birds. BLM fence

specifications were designed to reduce these conflicts, but some fences found in the UBHW were not meeting these standards or old fences, no longer in use, have not been removed.

Due to the regional losses of sagebrush communities, and the dependent wildlife uses, maintenance and improvement of existing sagebrush habitat is important. Important sage grouse seasonal habitat is centered on breeding and winter complexes found on private and state lands in the UBHW. Nesting usually occurs within two miles of the lek, where suitable habitat is available.

Existing sage grouse habitat in the watershed on BLM lands is limited to nesting and brood rearing. No leks occur on BLM within UBHW and no MFWP sage grouse core habitat is identified in the UBHW. However, due to proximity of leks adjacent to BLM lands, sagebrush and riparian habitats provide for nesting and brood rearing. Nesting and summer habitat is provided on Steel Creek allotment and Fox Gulch unleased, and to a lesser extent, Moosehorn and Foxtail allotments. Most of the habitat on the west side of the UBHW is forested and does not provide sage grouse habitat. The *Management Plan and Conservation Strategies for Sage Grouse in Montana* completed by the Montana Sage Grouse Working Group will be used as a guideline for future management of sagebrush habitat.

Pygmy rabbits have been documented in the UBHW, but due to the small amount of sagebrush habitat on BLM lands in the UBHW, there are few documented occurrences on BLM lands. Inabnit Butte is the only place pygmy rabbits were documented on BLM lands in the UBHW. Surveys in 2009 on the remaining BLM allotments in the watershed yielded negative results. However, pygmy rabbit populations that were documented by Rauscher (1997) are still active on state and private lands within the UBHW.

Current management is maintaining the mid-late seral plant communities in sagebrush habitats. It is implied that if Uplands are in Proper Functioning condition, habitat requirements for sagebrush obligate species are generally being met.

Riparian, Aquatic and Wetland Habitat and Associated Species

Riparian habitat and stream conditions are discussed above, under Western Montana Standard #2. Riparian and wetland habitats receive a disproportionate amount of wildlife use with approximately 75% of all wildlife species in this area utilizing riparian habitat for at least some portion of their annual life cycle. These riparian and wetland communities around springs and seeps in sagebrush habitats are crucial water sources for all wildlife and are essential to maintain biodiversity within the watershed. Beaver activity was common in most streams on BLM lands in the UBHW with few of them having recent activity. Beaver play a keystone role in creating and maintaining riparian habitat and associated wetlands.

Riparian and wetland habitats are generally dominated by willow, aspen, or cottonwood communities along foothills, streams and often represent stringers of habitat extending below forested areas into sagebrush/grassland habitat and into lower elevation foothills. Most nesting by migratory song birds occurs in this habitat. See discussion under Western Montana Standard #2 for existing condition.

Functionality and habitat conditions of the majority of fish bearing streams assessed were found to be meeting standards and were in good or improving condition. Fishery habitat condition is directly linked to existing riparian conditions. Impacts that cause riparian habitat to not be in PFC condition also generally will result in low quality fish habitat. The main impacts affecting fishery habitat within this watershed were found to be related to livestock management and irrigation. For detailed description of impacts related to specific stream functionality refer to the riparian findings and analysis section above.

Recent population surveys in the Big Hole River have found historic low numbers in traditional survey reaches for this population. There is currently a status review in process for this population to determine if a federal listing is warranted.

Grayling occurrence on waters adjacent to public land within the UBHW is very limited. Based on recent MFWP grayling sampling efforts, with the exception of reach #1917 located on the main stem of the Big Hole River downstream of Wisdom, grayling are not found within the UBHW adjacent to public land. As current MFWP habitat improvement projects continue to improve conditions within the drainage, grayling use could occur in the future.

The population of WCT remaining in Woody Creek is being impacted by low quality habitat directly related to impacts associated with current livestock management and very restricted amounts of available habitat. In addition, the stream also supports a population of non-native eastern brook trout that is contributing to the decline of this population. Based on the low numbers of remaining WCT, without improvements to the available habitat and reduction or complete removal of the non native brook trout, it is likely that this population will be extirpated within the next 10 years.

Recent pearlshell mussel surveys conducted by MFWP, the Forest Service and Montana Natural heritage Program, have shown range wide declines as impacts related to agricultural runoff and siltation reduce available habitat (Montana Field Guide 2009). An additional threat to existing pearlshell populations, within the UBHW, is the loss of it primary host species the WCT. Within most of the Big Hole drainage, WCT populations have been extirpated and replaced with non native eastern brook trout, substantially reducing the ability of the remaining population to reproduce. Nearly every population within the Big Hole drainage is composed primarily of large, very old adult mussels, indicating little reproduction.

Forest and Woodland Habitat and Associated Species

Many wildlife species using forest and woodland habitats are generalists that use sagebrush/grasslands as well as riparian habitat and are discussed above. Much of the forested habitat in the UBHW is used seasonally and wildlife use is limited in the winter. Big game populations remain stable, while mule deer and white-tailed deer populations have always been low, elk numbers are within MFWP management objectives. Most of the elk migrate into Idaho in winter and moose remain in the UBHW. Deer populations in the UBHW are not large but a few of them do remain in the valley during winter. As stated earlier, this creates conflicts between wolves and livestock, due to the lack of prey availability for wolves in winter. The lodgepole pine regeneration in the clearcut's from the 80's and 90's (Figures 9 & 10 above) is tall enough and dense enough to provide for screening and hiding cover for big game.

Migratory birds, raptors and bats use forested habitats for nesting, roosting and foraging. Increased insect infestations create opportunities for a host of insect foraging bird species and the increased snag densities create nesting cavities. Pealing bark from dead trees can provide roost structures for forest bat species. However this also increases the vulnerability of losing these stands due to wildfire. The loss of aspen regeneration reduces the habitat availability for future generations of riparian dependant wildlife species to thrive.

Many large carnivores use forested habitats almost exclusively. Black bears, gray wolves and pine martens are the primary large carnivores found in the UBHW and to a lesser extent, mountain lions, bobcats and wolverine. A few occurrences of fisher and have been reported in the past. As stated earlier, the extent of large carnivore habitat on BLM lands in the UBHW is limited due to the nature of large home ranges required for many of these species,

Lodgepole pine in the UBHW has a diverse age class. There is a high hazard for MPB outbreak and subsequent mortality in areas where continuous mature stands are present. Allotments noted with current MPB activity include North Fork Big Hole, Moosehorn, Miner Creek, Fox Gulch Unleased, Mussigbrod, and Wildwood. Allotments where MPB populations are at endemic levels but expected to increase include Foxtail, Warm Springs, and the eastern-most portions of Dry Creek and Jumbo Mountain. It was also noted that lodgepole pine found in the southwestern portion of the UBHW, not on BLM-administered lands, are more homogenous stands due to historic fire cycles.

Douglas-fir stands do not have a diversity of successional stages. Forested areas primarily dominated by mature Douglas-fir are considered high risk for Douglas-fir beetle outbreaks. Allotments at risk include Miner Creek Unavailable, Steele Creek, Mussigbrod, and Wildwood. Parcels observed during the assessment with current bark beetle activity were Fox Gulch Unleased and on lands not administered by the BLM adjacent to Miner Creek Unavailable.

Douglas-fir trees expanding into sage/grassland habitats and aspen woodlands are typically less than 65 years old. Warm Springs and Steele Creek allotments were found to be experiencing moderate to high levels of conifer expansion into sage/grasslands; and Moosehorn, Foxtail, and Dry Creek allotments were noted as experiencing low to moderate levels of expansion into sage/grasslands. All aspen woodlands in the UBHW are experiencing moderate to high levels of conifer expansion.

Almost all aspen stands in the UBHW do not exhibit age class variety. Only mature stands and early regeneration not exceeding browse height were noted on the assessment, with the exception being the manipulated aspen found regenerating on Wildwood Individual. Bartos and Campbell (1998) have classified western aspen existing primarily in three different types: (1) stable, (2) successional to conifers, and (3) decadent and falling apart. Stable aspen is considered to be functioning properly with various ages and size classes throughout the stand. It is estimated that approximately 90% of the aspen seen during the assessment were a mixture of both 2 and 3.

Ponderosa pine in the UBHW is not vigorous and reproducing satisfactorily, nor is the spatial distribution of the species suitable to ensure the reproductive capability and recovery.

Though there were no Whitebark and few Limber pines found on BLM-grounds during the assessment, both species are experiencing high levels of mortality throughout their range due to MPB and/or white pine blister rust.

Current Condition Classes:

Fire Regime Condition Class (FRCC) is a classification of the amount of departure from the natural fire regime (Hann and Bunnell 2001). Coarse-scale FRCC classes have been defined and mapped by Hardy and others (2001) and Schmidt and others (2002), based on a relative measure describing the degree of departure from the historical natural fire regime. This departure is from changes to one (or more) of the following ecological components: vegetation characteristics (e.g., species composition, structural stages, stand age, canopy closure, and mosaic pattern); fuel composition; fire frequency, severity, and pattern; and other associated disturbances (e.g., insect and disease mortality, grazing, and drought).

Three Condition Classes were developed to categorize the current condition with respect to each of the historic Fire Regime Groups. The three classes are based on low (Condition Class 1), moderate (Condition Class 2), and high (Condition Class 3) departure from the natural (historical) regime (Hann and Bunnell 2001, Hardy et al. 2001, Schmidt et al. 2002). Criteria used to determine current condition include the number of missed fire return intervals with respect to the historic fire return interval, and the current structure and composition of the system resulting from alterations to the disturbance regime. Low departure is considered to be within the natural (historical) range of variability, while moderate and high departures are outside. The relative risk of fire-caused losses of key ecosystem components increases as condition class designation increases.

The FRCC classifications for the UBHW based on the coarse-scale data presented in Table 10 are valuable for assisting managers in estimating actual ground conditions. However, due to the limits of satellite-based imagery, the coarse-scale estimates presented in Table 10 may differ from site-specific assessments made by members of the IDT. For example, the coarse-scale assessments obtained through satellite imagery do not take into account finer scale factors influencing condition class such as recent insect and/or disease outbreak, individual stand structure and associated biodiversity issues.

Table 10. Fire regime condition class for BLM-administered lands within the UBHW

Condition Class	Description	BLM Acres*	% of BLM Forested	Example of Typical Management
1	Fire regimes are within a historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within a historical range. Fires burning in CC1 lands pose little risk to the ecosystem and have positive effects to biodiversity, soil productivity, and hydrologic processes.	2,677	85%	Historical fire regime is replicated through periodic application of prescribed fire or through fire use.

Condition Class	Description	BLM Acres*	% of BLM Forested	Example of Typical Management
2	Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical frequencies by one or more return intervals (either increased or decreased) resulting in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range. Wildland fires burning in CC2 lands can have moderately negative impacts to species composition, soil conditions, and hydrologic processes.	2660 (NOTE: Actual forested cover in this condition class is approx. 133 acres. The remaining 2,527 acres is sagebrush/ grassland.)	4%	Moderate levels of restoration treatments are required, such as a combination of prescribed fire with mechanical/hand treatment.
3	Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals resulting in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range. Wildland fires burning in CC3 lands may eliminate desired ecosystem components, exacerbate the spread of unwanted non-native species, and result in dramatically different ecological effects compared to reference conditions.	332	11%	High levels of restoration treatments, such as mechanical treatments, are required before fire can be used to restore desired ecosystem function. Intensive efforts, which may include seeding, herbicide application, biomass removal, and other types of rehabilitation, are required for CC3 lands.
Current conditions are a function of the degree of departure from historical fire regimes resulting in alterations of key ecosystem components such as species composition, structural stage, stand age, and canopy closure. One or more of the following activities may have caused this departure: fire suppression, timber harvesting, grazing, introduction, and establishment of exotic plant species, insects or disease (introduced or native), or other past management activities (Laverty and Williams 2000).				

*Acreage discrepancies may occur through calculations made in GIS.

Based on the coarse-scale FRCC analysis, site-specific FRCC assessments, on the ground assessments, and historic photos of the area, the lower to mid elevation forested portions of the UBHW are moderately to severely departed from natural (historic) conditions. Based on

observations made during the assessment, the acreage calculations from Table 10 above have shifted more towards Condition Classes 2 and 3 due to factors unaccounted for such as insect and disease activity not present in the area at the time of survey, 2002.

Recommendations

1. Consider alternative livestock management strategies to improve riparian, wetland and aquatic habitat conditions on the Big Swamp, Big Swamp Creek, Mussigbrod On & Off, North Fork Big Hole and Warm Springs allotments.
2. Actively pursue disposal of the Swamp Creek unavailable parcel.
3. Analyze the use of mechanical treatments and/or prescribed fire to provide disturbance to promote regeneration where aspen are declining. In order to increase the likelihood of meeting project objectives, protection fences or other browse barriers may need to be considered where heavy browse pressure was preventing recruitment. All sources of browsing should be considered (i.e. moose, elk, deer, and cattle).
4. Collect genetic samples from the ponderosa pine found in the UBHW in order to participate in the Wyoming BLM's Genetic Study on Disjunct Ponderosa Pine Stands of the West.
5. Consider the use of pheromones and/or other insect and disease repellants, or mechanical treatments on/around the ponderosa pine found on BLM ground in order to maintain and protect the unique diversity they provide to the UHBW landscape.
6. Analyze the use of mechanical treatments and/or prescribed fire to reduce fuel loading, improve forest health, and utilize timber resources in areas affected by insects/disease, particularly in the Yank Swamp and Rock Creek areas (Moosehorn, Foxtail, Dry Creek, and Jumbo Mountain allotments)
7. Continue to work cooperatively with Beaverhead County and other agencies, landowners and partners to manage noxious weeds within the UBHW
8. Continue to participate in the Continental Divide Barrier Zone project and work on establishing an accurate inventory of all noxious weeds both within the UBHW and the surrounding areas.
9. Continue to work cooperatively with MFWP in arctic grayling restoration projects within the Big Hole Watershed.
10. Work with the U.S. Forest Service and MFWP to identify opportunities to expand or re-introduce native WCT on BLM administered lands within the Big Hole Watershed.
11. Consider corridor fencing Woody Creek to reduce livestock impacts to habitat for WCT.
12. Consider installing a fish barrier and performing a non native eastern brook trout removal in Woody Creek to preserve the remaining WCT population.
13. Recommend adding the western pearlshell mussel to BLM's Special Status Species list
14. Modify existing wildlife barrier fences wherever they occur. The need to construct new fences should be evaluated to minimize the potential to restrict wildlife movements. Remove fences no longer needed for management purposes.

Other Issues or Concerns Noted or Suspected on BLM Lands

1. Stream diversions
2. Irrigation ditches
3. Drainage ditches
4. Unauthorized irrigation
5. Unauthorized road improvements
6 Unauthorized fences
7. Some allotment boundary fences are several feet to hundreds of feet on the BLM side of the BLM/Private property line resulting in considerable BLM acreage fenced in with private land.
8. Vehicle ways (2-track roads) used to access private property across BLM aren't "designated routes".

Additional Recommendations &/or Management Opportunities

Watershed level management or project recommendations:

1. Continue cooperative noxious weed control efforts with all landowners and stakeholders.
2. Explore opportunities to exchange or dispose of BLM lands in the UBHW that are difficult or impossible to manage including:
    a) Transfer BLM lands adjacent to the Beaverhead National Forest to the Forest Service.
    b) Transfer isolated tracts of BLM lands with public access to the State of Montana.
    c) Exchange BLM parcels with adjacent private land owners for private land adjacent to other federal or state land.
    d) Sale of BLM lands to adjacent private landowners.

Site specific management or project recommendations:

1. Remove the bridge over stream reach 1904.
2. Review and revise the roads designated open in the Dry Creek allotment.

Interdisciplinary Team Composition

Core IDT members for the UBHW Assessment include:

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